



NOAA
FISHERIES

Gulf Fisheries Branch, SEFSC

SEDAR 100: US Gulf of America Gray Triggerfish (*Balistes capriscus*)

Review Workshop
Data

August 11, 2026

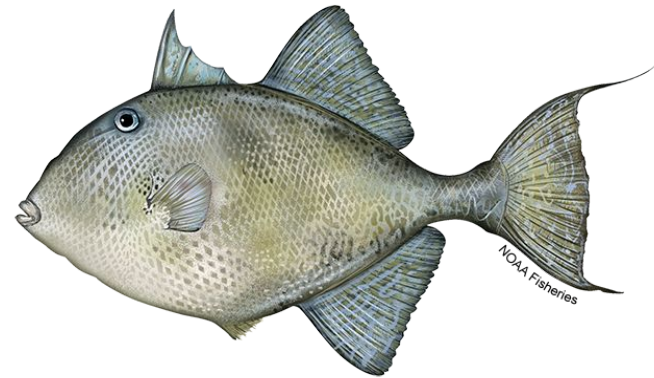


Photo courtesy of F. Forrestal

Outline

- Data Review
 - Stock definition
 - Assessment history
 - Regulations
 - Key data decisions
 - Life history
 - Removals
 - Size compositions
 - Age compositions
 - Indices of abundance
 - Survey length composition

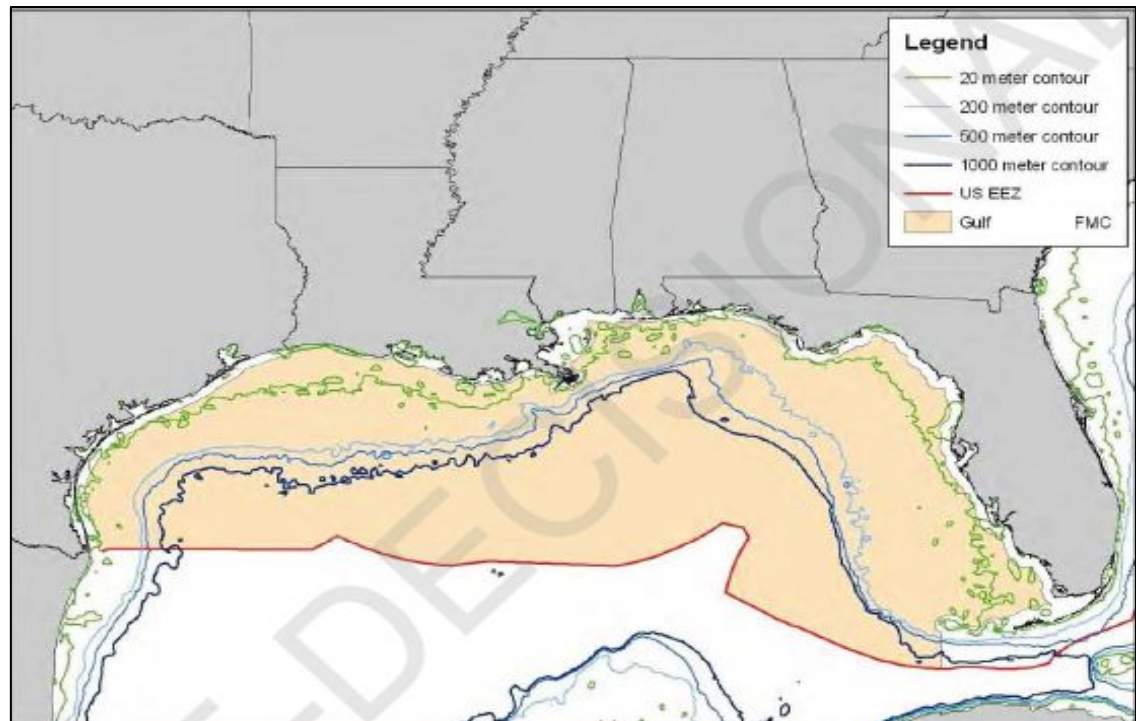
Gray Triggerfish: *Balistes capriscus*



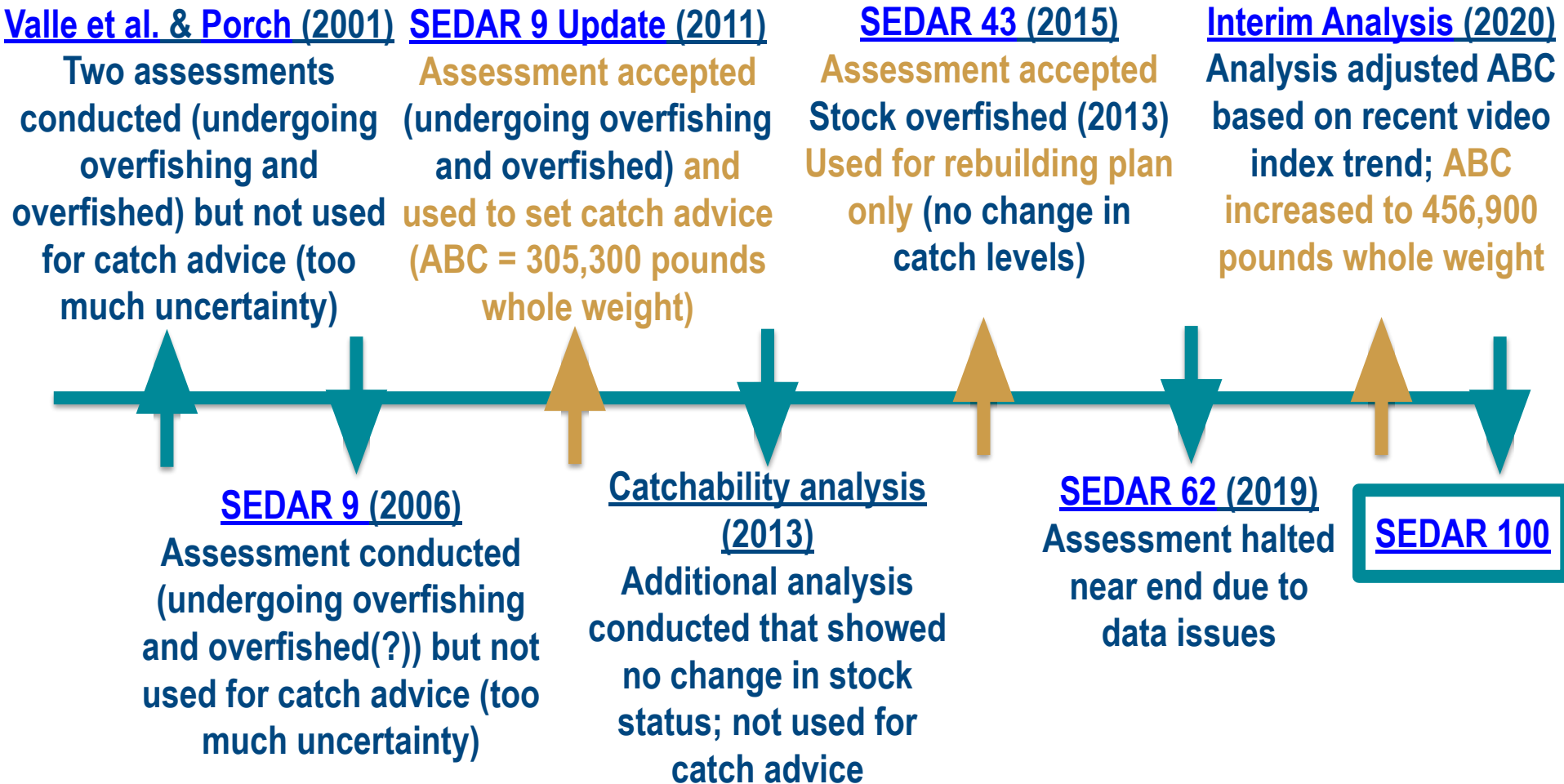
- Assessment model
 - Model building
 - AP Model configuration
 - AP Model results
 - AP Model diagnostics
 - AP Model sensitivities
 - AP Model projections

Stock/management boundary

- Gulf stock is separated from the South Atlantic at council boundary line (U.S. Highway 1 in Florida Keys)
- Assumed single unit stock in the Gulf
 - Prolonged and indeterminate pelagic phase
 - Potential of wide dispersal
([SEDAR 2006](#))



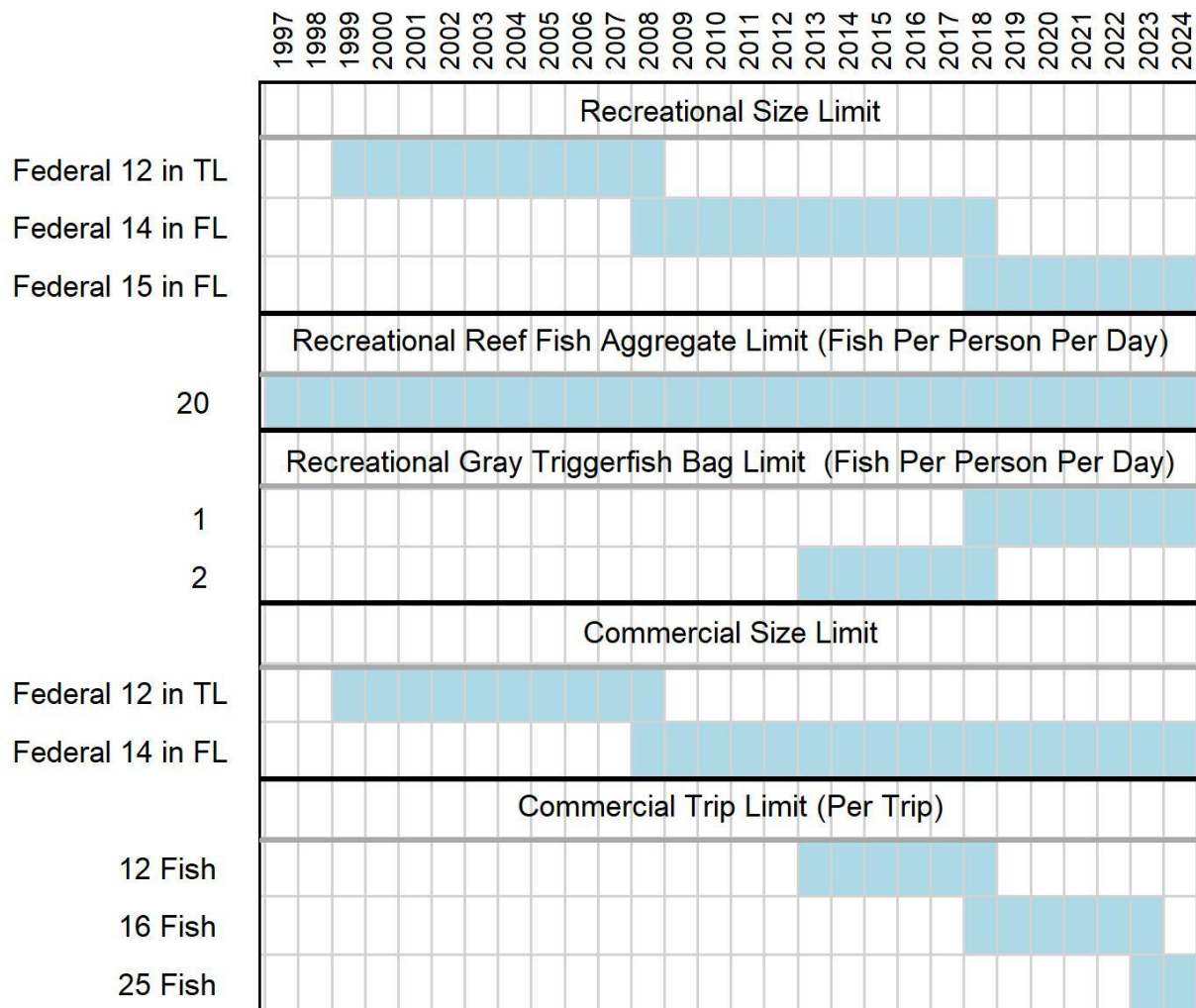
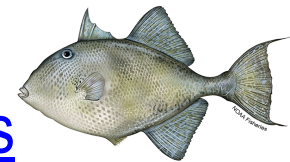
Past assessment history



Regulations

- Recreational & Commercial size limits
 - TL = Total Length
 - FL = Fork Length
- Recreational bag limits
- Commercial trips limits

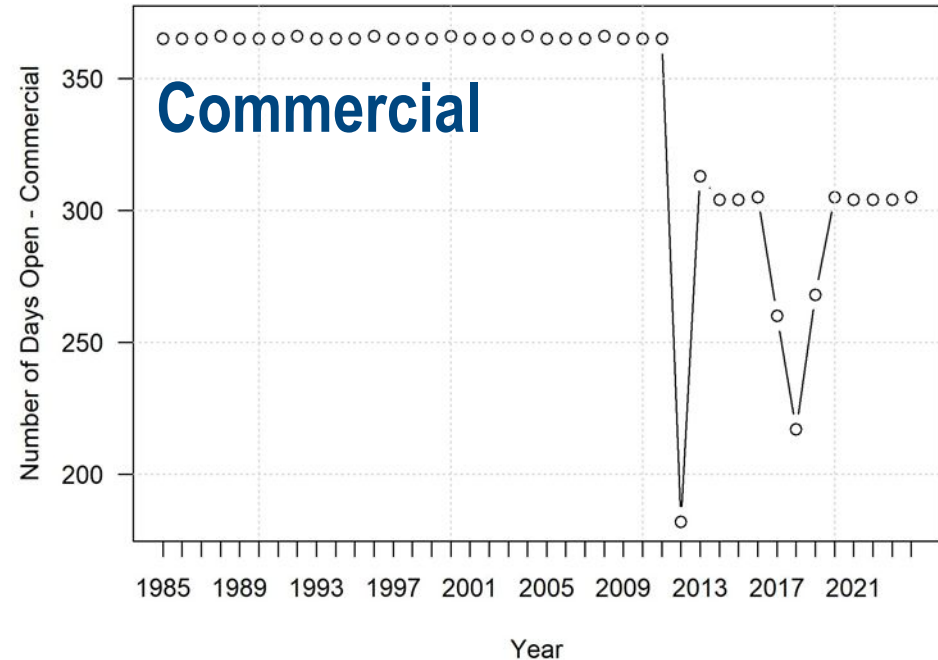
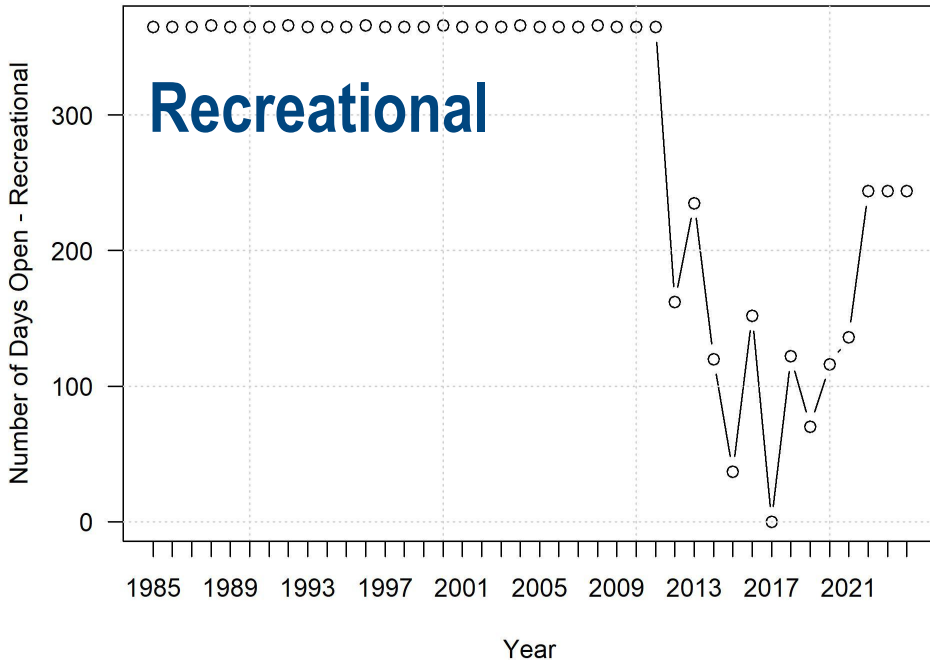
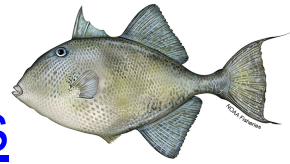
Gulf reef fish management histories



Overlapping cells reflect change in that year

Season length

Gulf reef fish management histories



- Seasonal closures since 2012
- Numerous recreational and commercial quota closures since 2012

Recreational management <https://www.fisheries.noaa.gov/southeast/recreational-fishing-data/gulf-america-historical-recreational-landings-and-annual-catch>

Year	Fishing Year	Seasonal Closure	Total Reported	Units	ACT	Payback ACT	ACT %	ACL	Payback ACL	ACL %	Closure Date	Data Source
2024	Jan 1- Dec 31	Jan 1 - end of Feb and Jun 1 - Jul 31	194,587	ww	274,323		70.9	360,951		53.9		MRIP
2023			306,196		274,323		111.6	360,951		84.8		MRIP
2022			307,494		274,323		112.1	360,951		85.2		MRIP
2021			375,973		274,323		137.1	360,951		104.2	9/15/21	MRIP
2020			390,712		217,100		180.0	241,200		162.0	5/2/20	MRFSS
2019			310,868		217,100		143.2	241,200		128.9	5/11/19	MRFSS
2018			461,900		217,100		212.8	241,200		191.5	8/18/18	MRFSS
2017		June 1- July 31	62,731		217,100	0	0.0	241,200	19,987	26.0	1/1/17	MRFSS
2016			432,641		217,100	177,123	199.3	241,200	201,223	179.4	6/1/16	MRFSS
2015			94,174		217,100	30,107	43.4	241,200	54,207	39.0	2/7/15	MRFSS
2014			217,891		217,100	1,658	100.4	241,200	25,758	90.3	5/1/14	MRFSS
2013			453,251		217,100		NA	241,200		187.9	10/15/13	MRFSS
2012			277,720		217,100			241,200		115.1	6/11/12	MRFSS
2011			461,549		405,000			457,000		101.0		MRFSS
2010			296,360		405,000			457,000		64.8		MRFSS

Due to the timing of when payback notices were published and total reported landings updates were received, total prior year overages and Federal Register noticed payback-adjusted ACTs and ACLs may not match. %ACT and %ACL are based on nonpayback numbers as that is how an overage and subsequent payback is determined if needed. However, in years of a payback, landings are constrained to the payback ACT and are not to exceed the payback ACL.

2025 Preliminary Gulf of America Recreational Landings (lb) by Two-month Wave

Gray triggerfish	Jan 1- Feb 28 & Jun 1 - July 31	150	41,631	65,175	41,780	61,608	15,450	225,794	274,323	360,951	82%	63%	MRIP-CHTS	
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<https://www.fisheries.noaa.gov/southeast/recreational-fishing/2025-2026-and-2026-2027-gulf-america-recreational-landings-and>

Commercial management

<https://www.fisheries.noaa.gov/southeast/commercial-fishing/gulf-of-mexico-historical-commercial-landings-and-annual-catch-limit>

Year	Fishing Year	Seasonal Closure	Total Reported	ACT	Payback ACT	ACT %	ACL	Payback ACL	ACL %	Closure Date	Data Source
2024	Jan 1- Dec 31	Jun 1 - Jul 31	53,389	88,273		60.5	95,949		55.6		ACL_FILES_040521
2023			52,839	88,273		59.9	95,949		55.1		
2022			44,822	88,273		50.8	95,949		46.7		
2021			44,692	88,273		50.6	95,949		46.6		
2020			52,597	60,900		86.4	64,100		82.1		
2019			62,487	60,900	60,298	102.6	64,100	63,498	97.5	11/26/19	
2018			64,702	60,900		106.2	64,100		100.9	10/7/18	
2017			62,647	60,900		102.9	64,100		97.7	11/17/17	
2016			59,147	60,900		97.1	64,100		92.3		
2015			47,496	60,900		78.0	64,100		74.1		
2014			40,664	60,900		66.8	64,100		63.4		
2013			63,086	60,900	51,602	103.6	64,100	54,802	98.4		
2012			72,778	60,900		119.5	64,100		113.5	7/1/12	
2011			105,251	106,000		99.3	138,000		76.3		
2010			55,661	106,000		52.5	138,000		40.3		
2009			78,117	93,000		84.0	122,000		64.0		
2008			76,717	80,000		95.9	105,000		73.1		
Due to the timing of when payback notices were published and total reported landings updates were received, total prior year overages and Federal Register noticed payback-adjusted ACTs and ACLs may not match. %ACT and %ACL are based on nonpayback numbers as that is how an overage and subsequent payback is determined if needed. However, in years of a payback, landings are constrained to the payback ACT and are not to exceed the payback ACL.											



SEDAR 100 key data decisions needed for model development



SEDAR 100 approach for data provision

- Since [SEDAR 9](#), have used a **one area model** but treat **fishing fleets as areas**:
 - All fishery-dependent data split into **West** and **East** to capture differences in selectivity and fishing mortality
 - Fishery-independent and shrimp bycatch Gulf-wide

Requested all data split:

1. **West** vs **East**
2. Gulf-wide

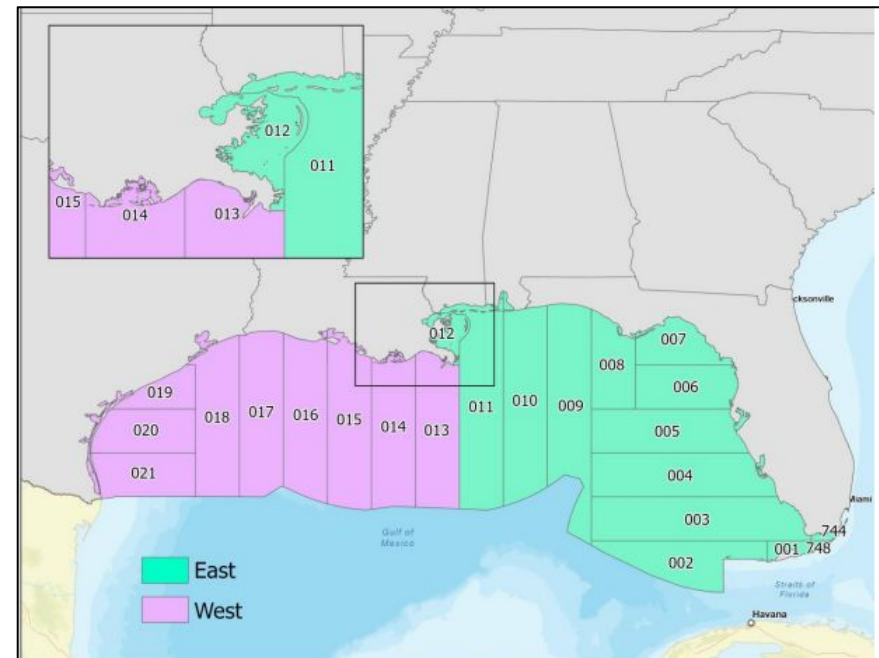


Figure 1 in [DW05](#)

SEDAR 100 approach for modeling

- Started with SEDAR 43 Base Model as our continuity
 - Considered SEDAR 62 model configuration changes

Main modeling questions for SEDAR 100:

1. Which composition data (length, age, or both) to use and how to define selectivity (age-based or length-based)?
2. Do data support:
 - A true two-area (East vs West) model configuration?
 - The continuity approach of treating fishing fleets as areas?
 - A Gulf-wide model?

1. SEDAR 100 approach for compositions

- Which composition data (length, age, both) to use and how to define selectivity (age-based vs length-based)?

Data Input (Availability)	Fishing Fleet	Survey	Shrimp Bycatch
Length compositions	Yes: DW04 , DW07 , DW11 , DW13	Yes	(Trawl as Proxy)
Age compositions		Trawl only	
Conditional age-at-length			
Mean length-at-age (of landings)			

Gulf Gray Triggerfish
Assessment Terms of Reference
May 2025

Data Workshop

Assessment Process

- Explore the appropriateness of an age-based, length-based, and hybrid (age- and length-based) approaches for describing fleet and survey selectivity.
- Consider continuity model stratification and data structure and suggest any recommended revisions.
 - Explore fleet-specific length compositions



Ageing improvements for SEDAR 100

- Enormous undertaking by Life History team to revise age data and ageing error matrix for this assessment
- Re-aged all fish 5+ years to reduce bias when reading spines based on protocol developed by Potts et al. (2023) and later validated by Chamberlin et al. (2024)[[RD03](#)]

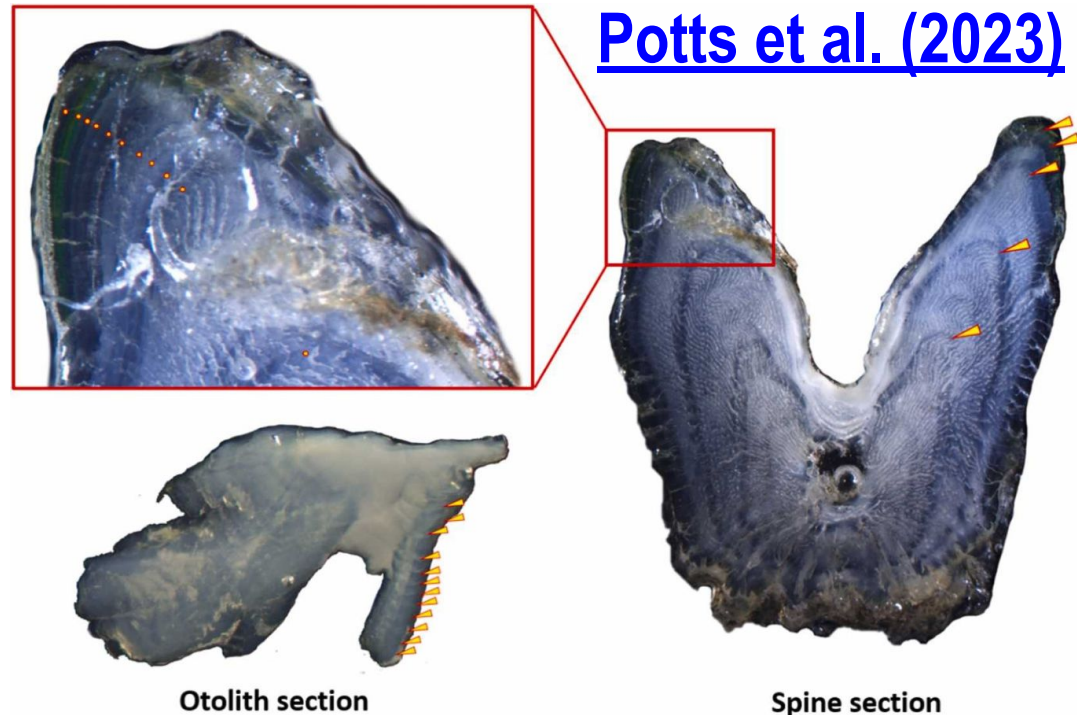
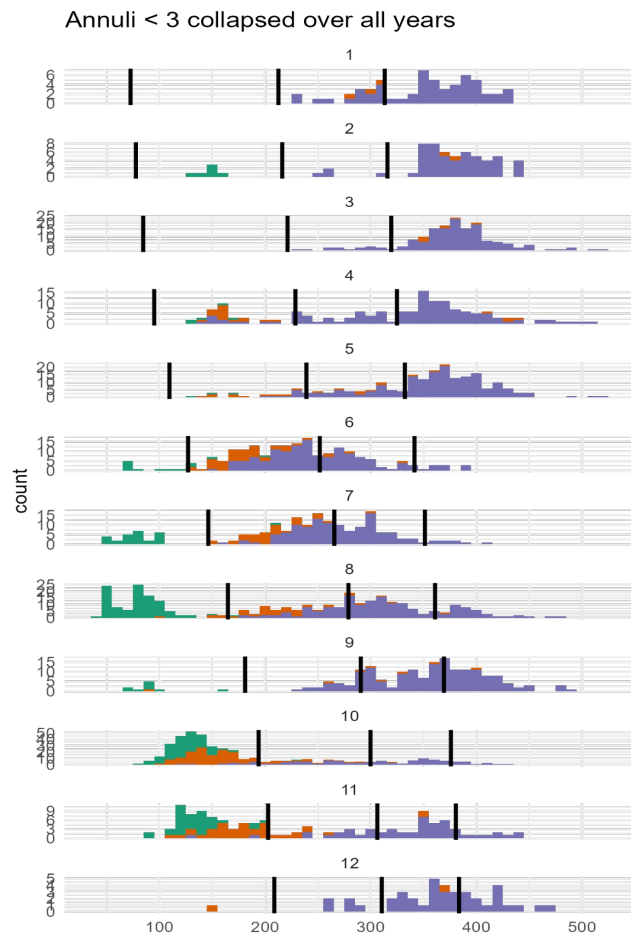


Fig. 10. Images of an otolith section and spine section from the same individual gray triggerfish, *Balistes capriscus*. Yellow arrows represent initial age readings (otolith age = 12 and spine age = 5). Inset is magnified area of spine containing wide translucent zone showing compacted growth zones (yellow dots). The faint yellow/green mark on the spine section is the calcein chemical mark.

Ageing improvements during SEDAR 100

- Re-evaluated calendar age assignments for samples with annuli counts of 0 and 1 by re-ageing and then using ELEFAN and age slicing

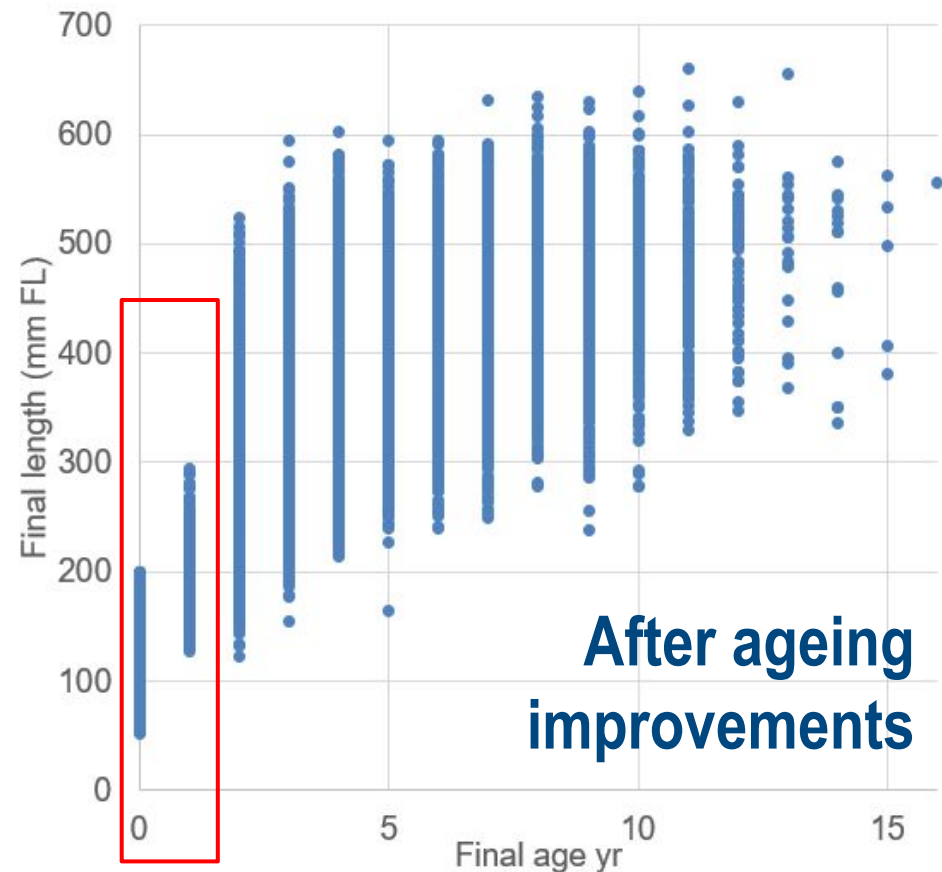
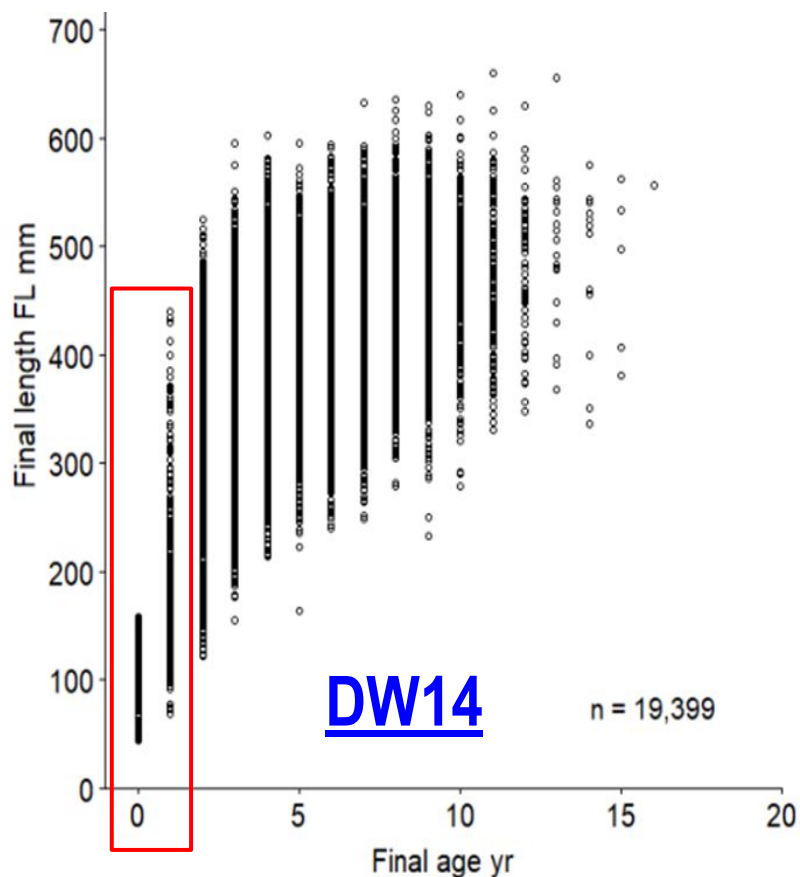


Figures 2.14.7-8 in
[Data Workshop Report](#)



But... ageing remains a key uncertainty

- Species remains very difficult to age
 - Concerns voiced in public comments ([DW20](#))



SEDAR 100 composition data approach

DATA

- Input length compositions
 - Weighted preferred, nominal if not available
- Input age compositions (conditional age-at-length preferred but nominal if needed)
 - Weighted age compositions are limited by data, and their inclusion prevents the use of weighted length compositions in the model (they are used to weight the age comps)

MODEL

- Input ageing error matrix to account for uncertainty in age estimates
- Use length-based selectivity for all fishing fleets, shrimp bycatch, and surveys



2. SEDAR 100 approach for area(s) modeled

- How many areas to model?

Assessment Process

	Continuity	Alternate 1	Alternate 2
Number of Areas	1, but fleets treated as areas: Fleet 1 = Recreational East Fleet 2 = Recreational West ...	1 (Gulf-wide)	2 (East and West separated)
Data Needs	Fishery-dependent data by region	All data inputs provided Gulf-wide	All data inputs provided East and West

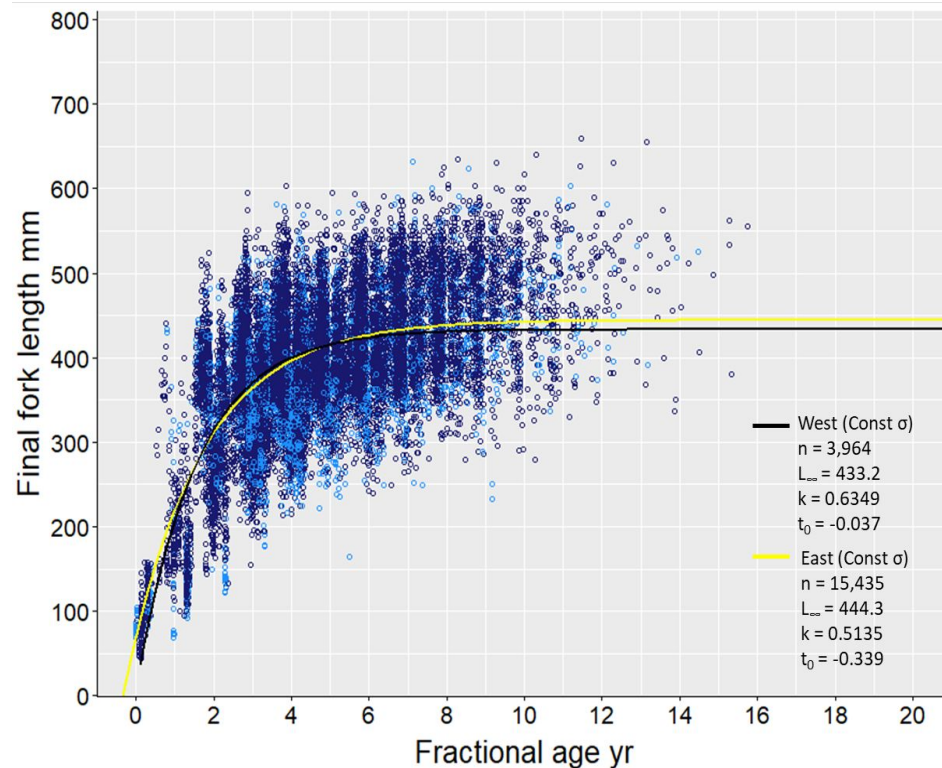
- Consider continuity model stratification and data structure, and suggest any recommended revisions.
- Re-evaluate whether commercial and recreational fleets should be separated by East and West by reviewing all available data (landings, discards, indices, compositions).



Support for true two-area model?

- Is there strong evidence to support different stock structure between East and West? - No
 - Considered a single stock based on the species' prolonged, indeterminate stage
 - No differences in growth evident between West and East in SEDAR 100

Figure 2.14.10 in [Data Workshop Report](#)



Is there support to continue with fleets-as-areas?

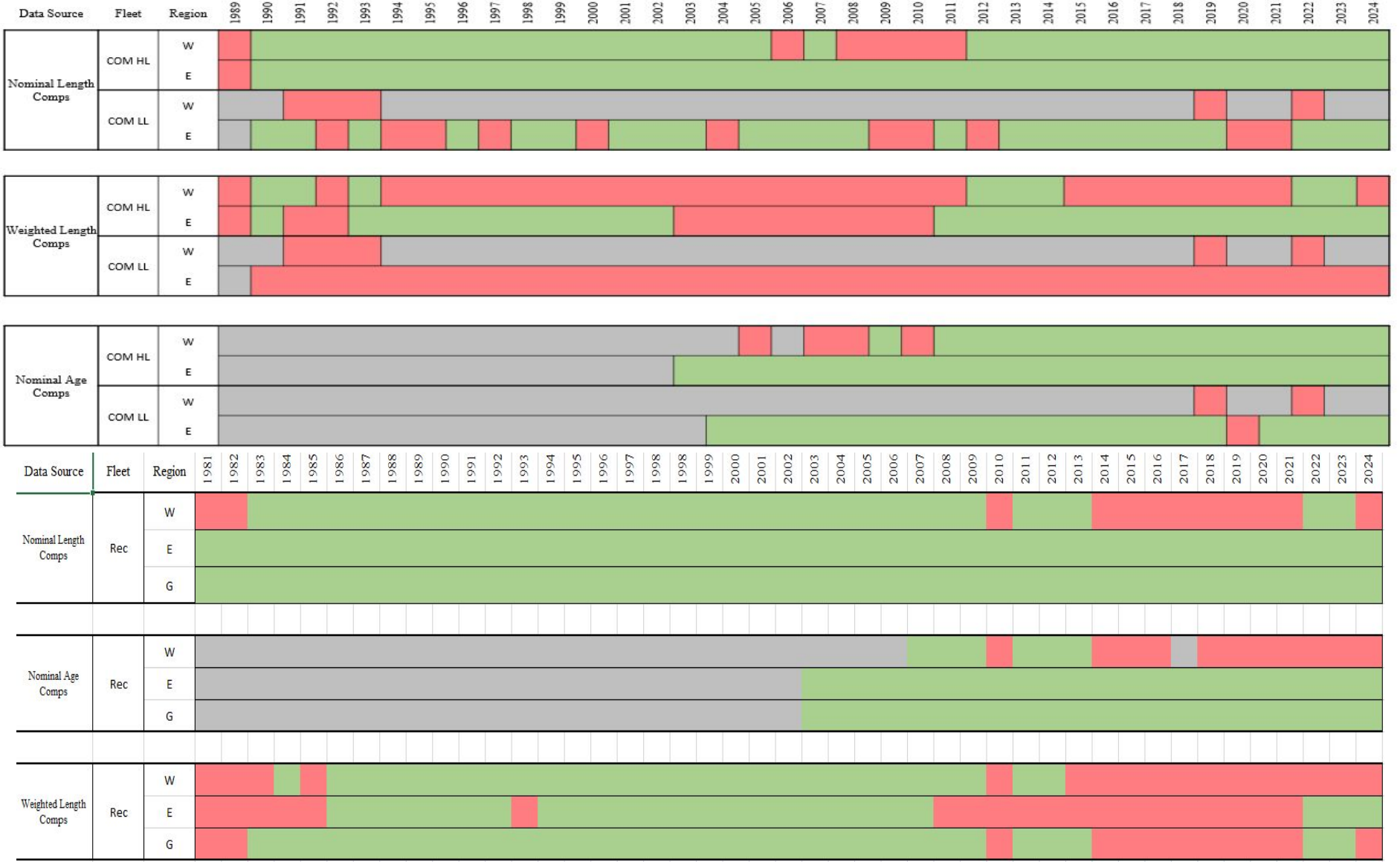
- Do data support separating West and East fishing fleets?
- Majority of data from East, generally limited data in the West

Type of data	Rec West	Rec East	Com* West	Com* East
Landings (numbers or weights*)	9%	91%	28%	72%
Discards (numbers)	4%	96%	15%	85%
Landings lengths (raw data)	19%	81%	37%	63%
Landings ages (raw data)	5%	95%	67%	33%
Discard length comp	NA	100%	7%	93%

	West	East
Shrimp Effort (Days)	75%	25%
Shrimp Bycatch (Numbers)	93%	7%



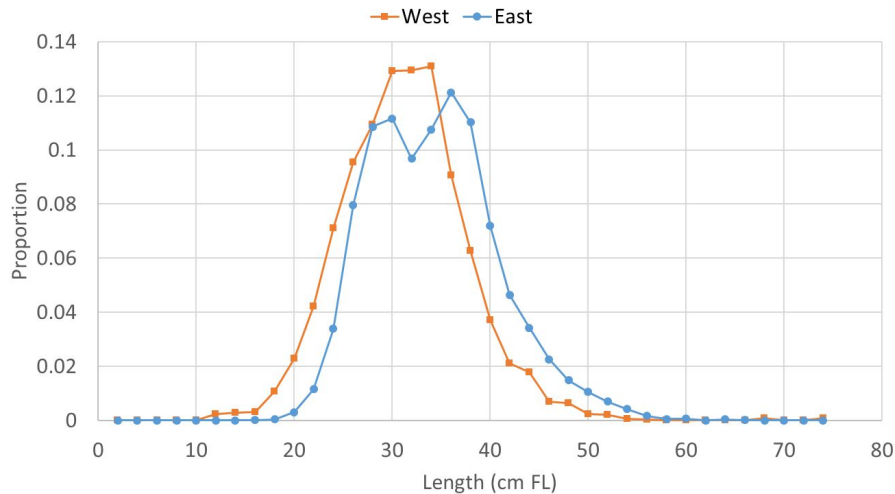
Composition data very limited in the West



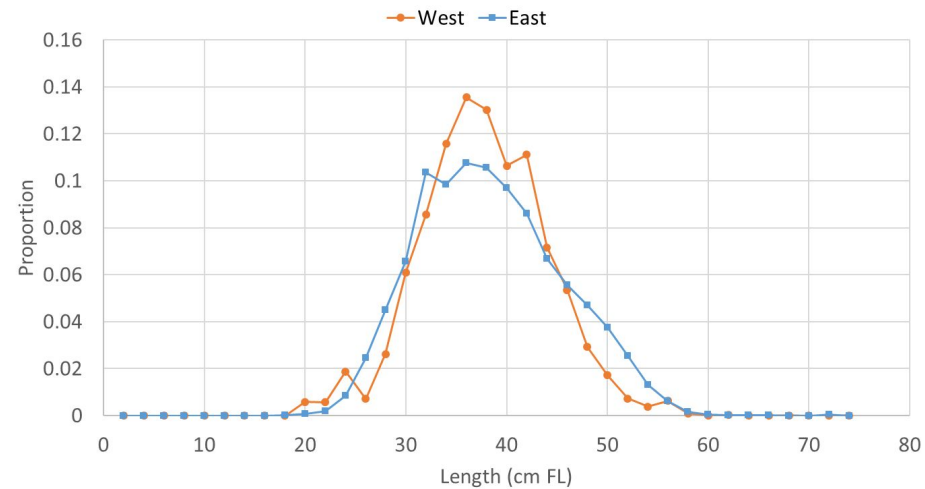
Tables 2.13.5 & 7 in [Data Workshop Report](#)

Length: Small differences between West vs East

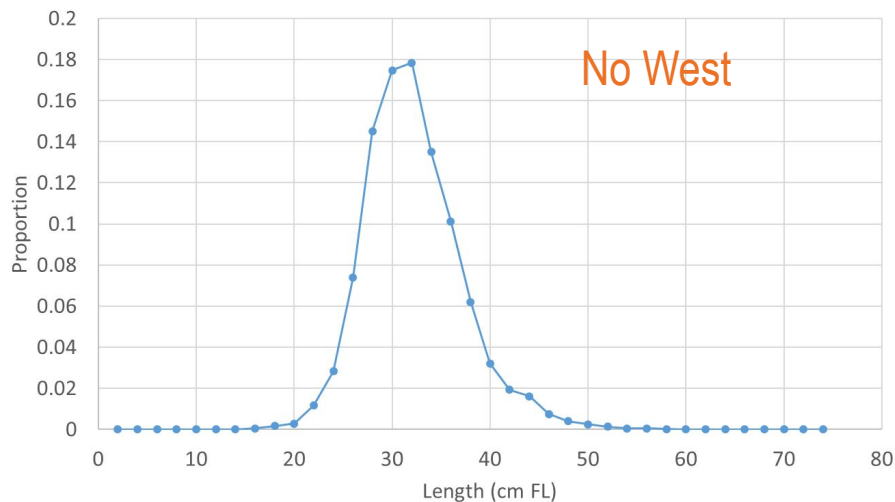
Recreational Landings Length Composition Weighted



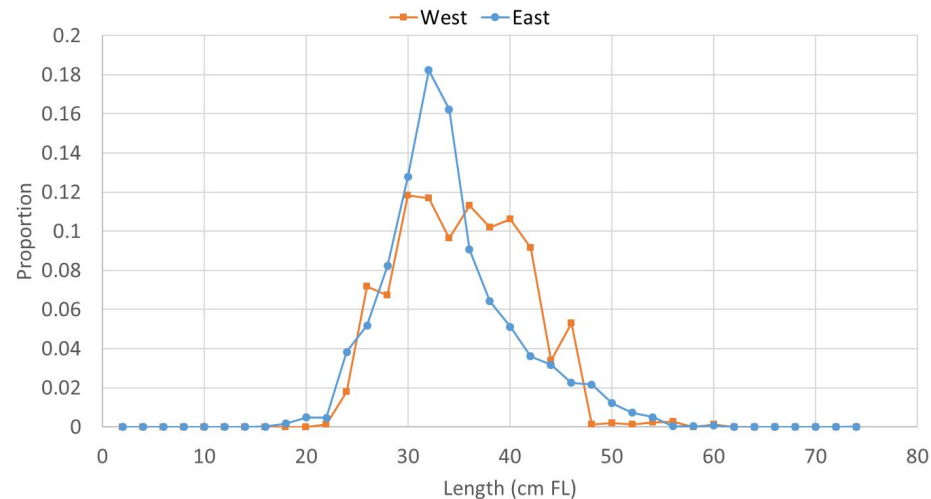
Commercial Landings Length Composition Weighted



Recreational East Discards Length Composition

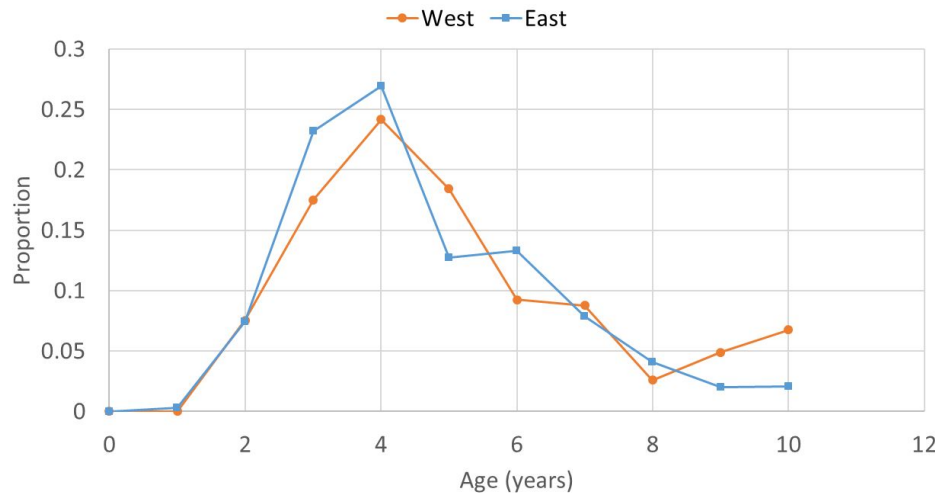


Commercial Discards Length Composition

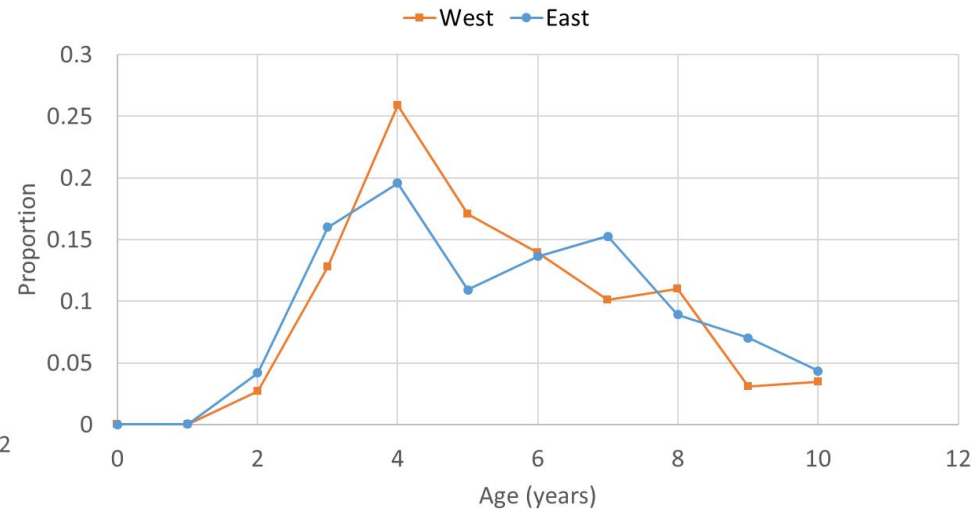


Age: Small differences between West vs East

Recreational Age Composition



Commercial East Age Composition



- Do data support separating West and East fishing fleets?
 - No
 - Limited data in the West
 - No strong evidence for different selectivities

Outline

Data Workshop

Assessment Process

- Data Review
 - Stock definition
 - Assessment history
 - Regulations
 - Key data decisions
 - **Life history**
- Removals
- Size compositions
- Age compositions
- Indices of abundance
- Survey length composition

3. Review available life history information, including the ageing methodology. Update growth curves, age and length data, and the natural mortality estimates.
 - Summarize, describe, and tabulate length and age data by year and fleet/survey and area through the terminal year of the assessment where possible.
 - Explore the validity and representativeness of length and age data and ageing methodology across ageing facilities and cooperators.
 - Explore differences in growth parameters if length and/or age sampling methods differ from the previous assessment. Utilize appropriate models and diagnostics to describe sex, population and region-specific growth, as warranted and applicable.
 - Develop age-length keys and Conditional Age at Length as appropriate.
 - Evaluate and discuss the sources of uncertainty and error, and data limitations (such as temporal and spatial coverage) for each data source.
 - Provide estimates or ranges of uncertainty for length and age data as a whole and by area and source.

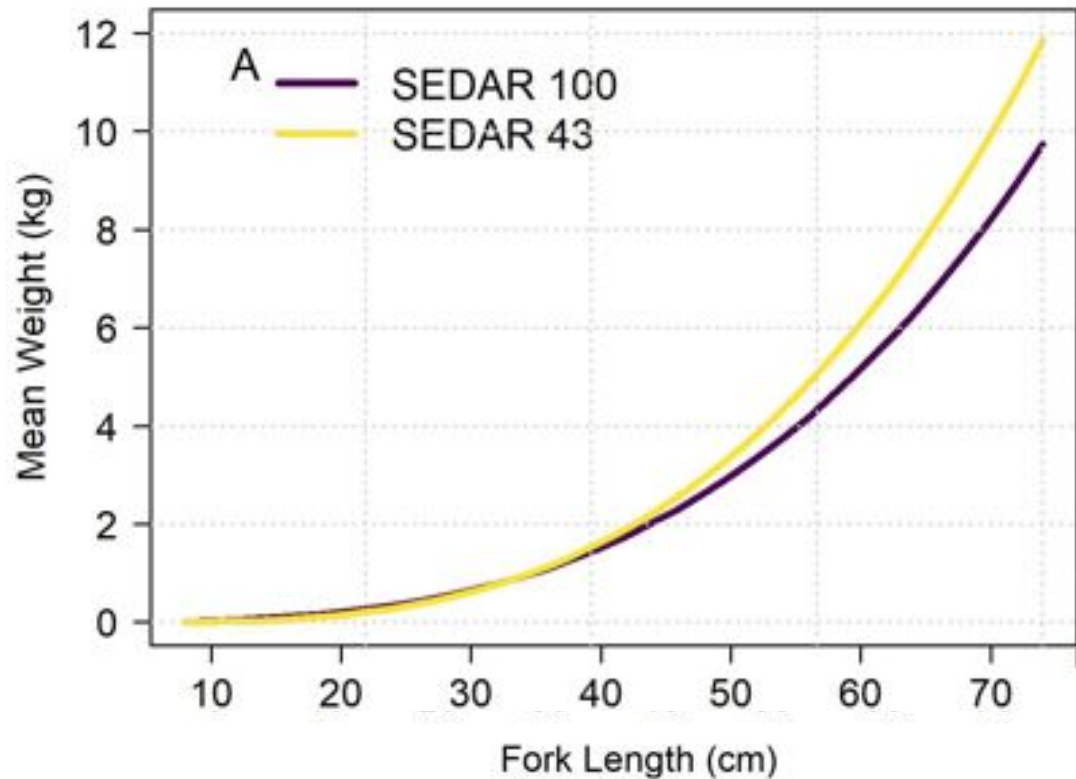
- Review ageing validation and ageing structures studies and consider their appropriateness for inclusion in the assessment model.
 - i. Update life history data/analyses (e.g., maximum age, growth, mortality, ageing error matrix, reproduction) given revised age data following recent ageing studies as needed.



Morphometrics

Regression	Equation	Statistic	N	Data Range
FL to wwt	$wwt = 1.704 \text{ E}^{-05} * (FL^{3.070})$	RSE = 175.4	11,332	FL: 6.1 – 61.7 cm FL; wwt: 0.006 – 5.840 kg wwt
FL to TL	$FL = \text{Max_TL} * 0.788 + 23.541$	$R^2 = 0.96$	6,322	Max_TL (cm): 1.6-75.3; FL (cm): 6.5-61.7

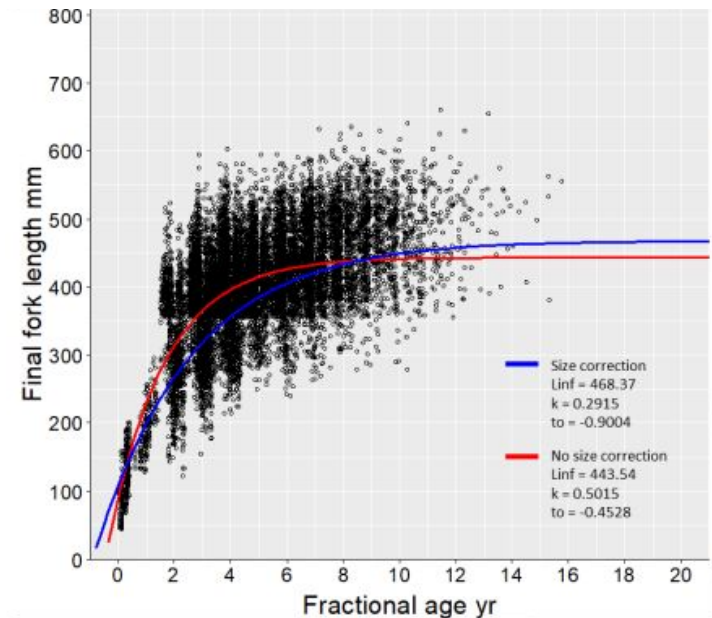
- Length-weight relationship fixed in the assessment model
- Body weight units:
 - Centimeters (cm) fork length (FL)
 - Kilograms (kg) whole weight (wwt)



Age and growth

Von Bertalanffy

- $L_a = L_{\infty}(1 - e^{-K(a-t_0)})$
- Size-modified combined-sex growth model with a constant CV at age
- Accounted for non-random sampling due to size limits



Parameter	SEDAR100	SEDAR 43	SEDAR 62*	SEDAR 9U
L_{∞} (cm FL)	46.837	58.97	46.33	86.82
K	0.292	0.14	0.28	0.11
t_0	-0.900	-1.66	-0.45	0.06
CV or SD	0.140	0.22	0.20	7.60

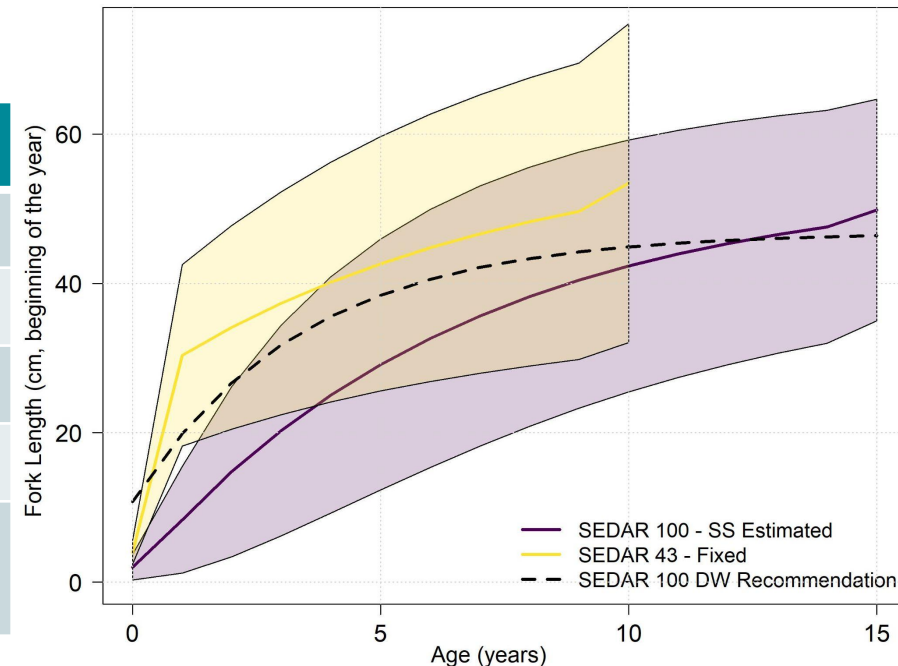
*Based on otoliths

Growth curve estimated in Stock Synthesis (SS)

- Growth curve was estimated in the assessment model
 - CV parameters were fixed at the model estimated values

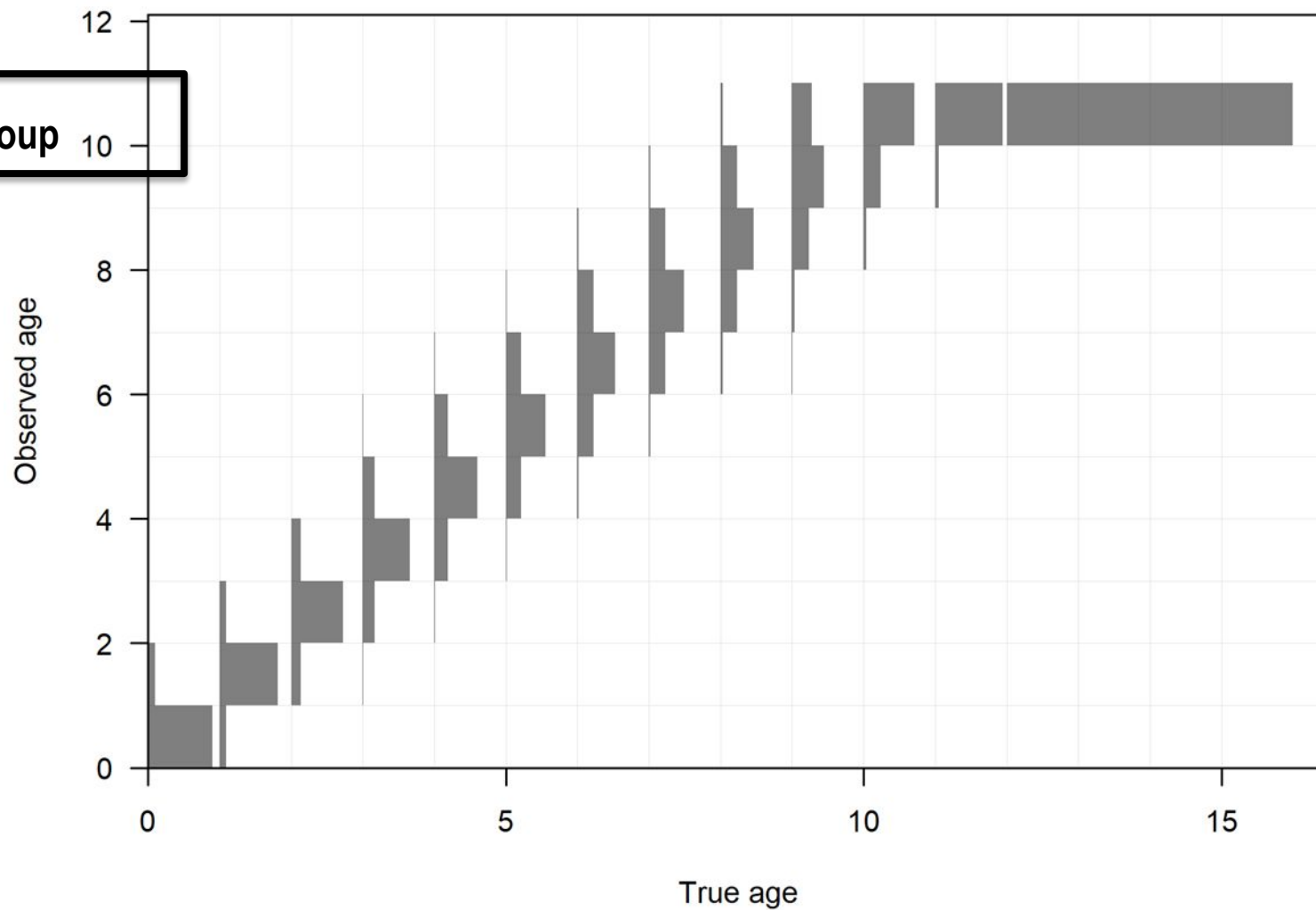
Parameter	Value	Status
L_{Amin}	8.353 cm FL	Estimated
L_{∞}	53.804 cm FL *	Estimated
K	0.153*	Estimated
t_0	-0.90	Not used in SS
CV	$\leq A_{min} (0.5) = 0.437^*$ $\geq A_{max} (15) = 0.124^*$	Fixed at model estimate

*Starting values were based on Data Workshop recommended values, but ultimately not used as priors



shaded area indicates the 95% distribution of length-at-age

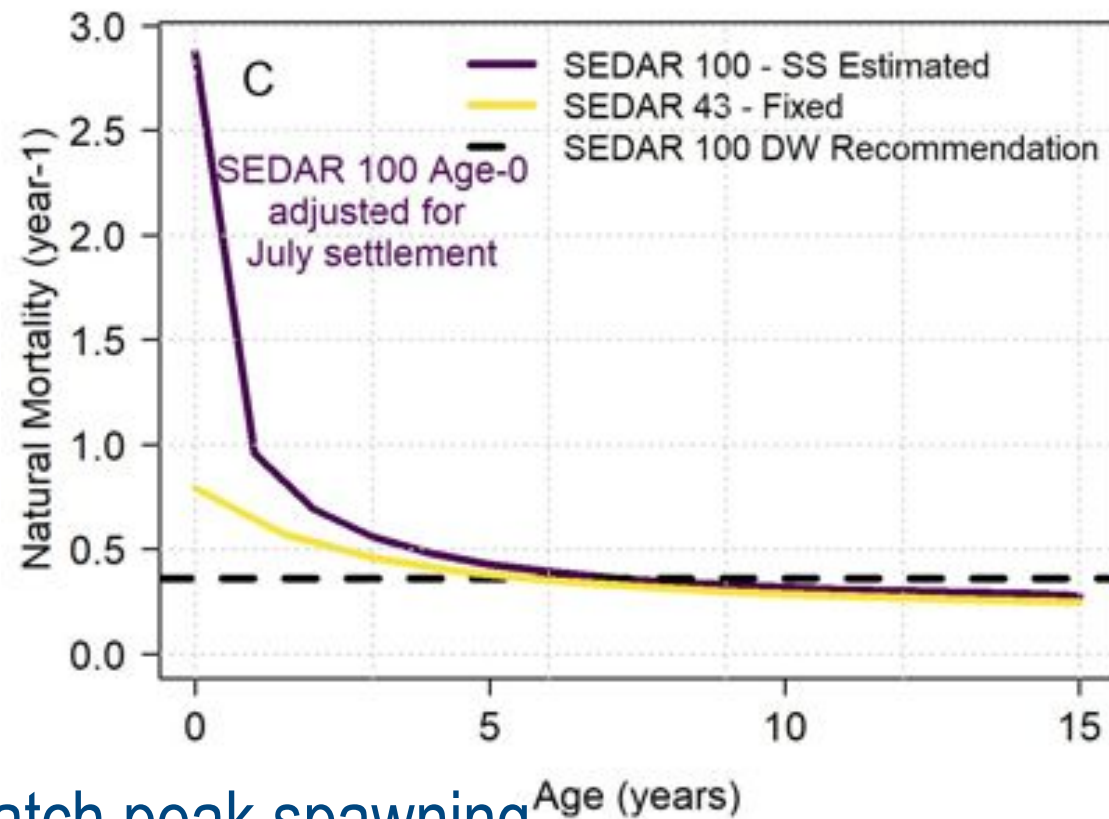
Ageing error matrix



Natural mortality (M)

- Used the Lorenzen estimator in Stock Synthesis and a target M estimated using [Hamel and Cope \(2022\)](#) assuming a maximum age of 15 years
 - SEDAR 100 = 0.36
 - SEDAR 43/62 = 0.28*
 - SEDAR9U = 0.27*

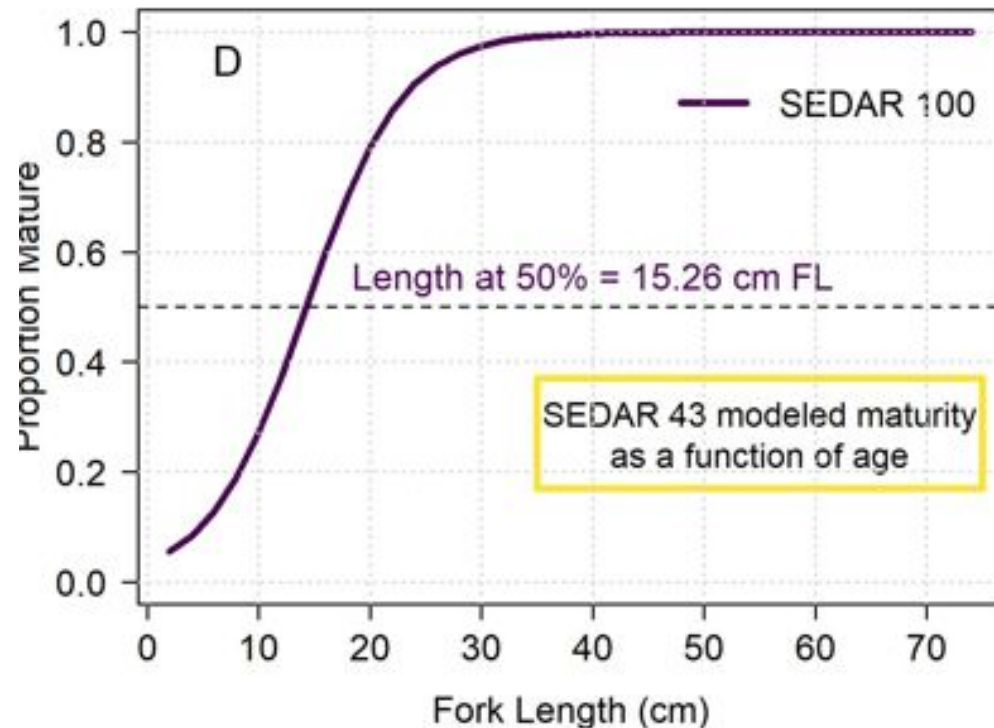
*Hoenig 1983
- Target M fixed within the assessment model
- Timing of settlement specified as July 1st to match peak spawning



Maturity

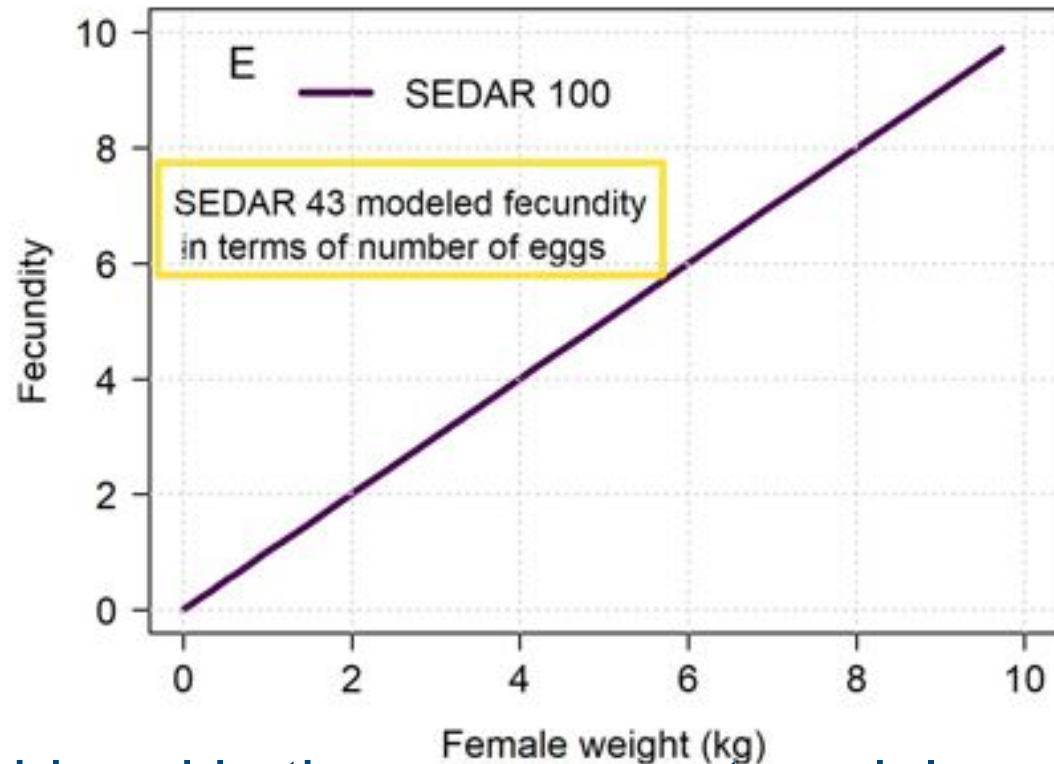
- Switched from maturity-at-age used in SEDAR 43 to maturity-at-length given ageing concerns ([DW20](#))
- First age mature = 2 years
 - Should be re-evaluated using updated age data
- Relationship fixed in assessment model

Parameter	Value	Status
Maturity 50%	15.259	Fixed
Maturity Slope	-0.232	Fixed



Fecundity

- Switched from specifying SSB in number of eggs to metric tons
- SEDAR 43 batch fecundity at length not recommended for use:
 - N = 73 covers subset of the population
 - No spawning frequency included
- Lack of uncertainty considered in the assessment model



Discard mortality (all fleets)

Assessment Process

- Consider recent discard mortality studies and analytical results and incorporate updated discard mortality rate(s) as appropriate.

- SEDAR 100:
 - Point estimate: 40%
 - Sensitivity runs: 26%, 60%
- Recreational discards by wave weighted by monthly discard rates from Hyman et al. 2026 (earlier analysis in [DW17](#))

Studies Reviewed

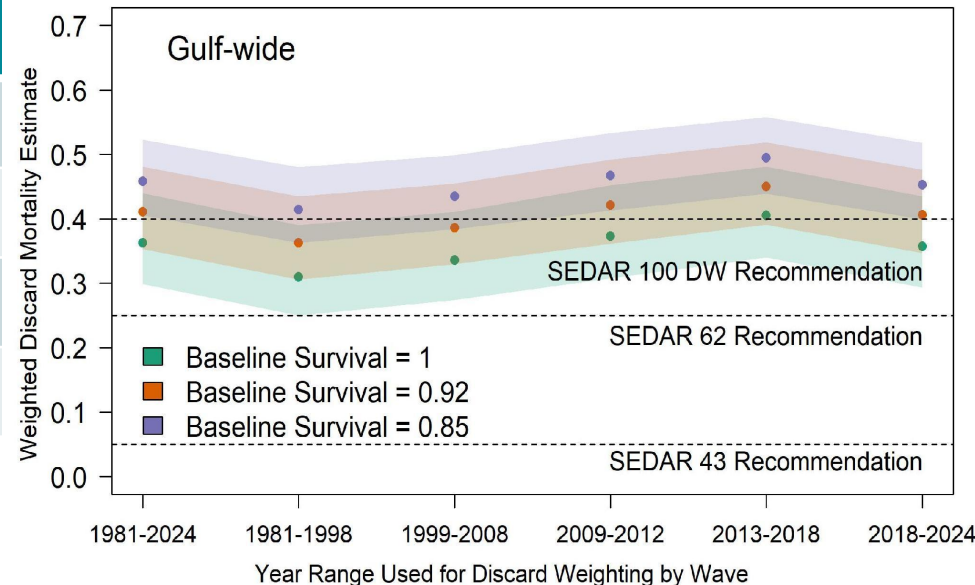
Runde et al. (2019) [[SEDAR100-RD05](#)]

Bohaboy et al. (2020) [[SEDAR100-RD01](#)]

Patterson et al. [[SEDAR100-RD02](#)]

Hyman et al. (2025) [[SEDAR100-DW17](#)]

[AP01](#)



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2. Use the Marine Recreational Information Program's Access Point Angler Intercept Survey and Fishing Effort Survey to inform catch and effort for the recreational sector. Consider state-specific catch, effort, and discards from state surveys as applicable (Florida: State Reef Fish Survey; Alabama: Snapper Check; Mississippi: Tails 'n Scales [effort]; Louisiana: LA Creel; Texas: TPWD Creel).

- Describe any annual differences in the magnitude of landings from the previous assessment greater than 10%, with assistance from the NOAA Office of Science and Technology.

5. Provide commercial catch statistics for both the Eastern and Western Gulf, including both landings and discards in both pounds and number extended through the terminal year. Provide a corresponding working paper for the data and analyses with the following:

- Evaluate and discuss the adequacy of available data for accurately characterizing landings and discards by fishery sector or gear in pounds whole weight.
- Provide length and age distributions for both landings and discards, if feasible.
- Provide estimates of uncertainty around each set of landings and discard estimates.

- Re-evaluate whether commercial and recreational fleets should be separated by East and West by reviewing all available data (landings, discards, indices, compositions).
- Provide estimates of uncertainty around each set of landings and discard estimates.

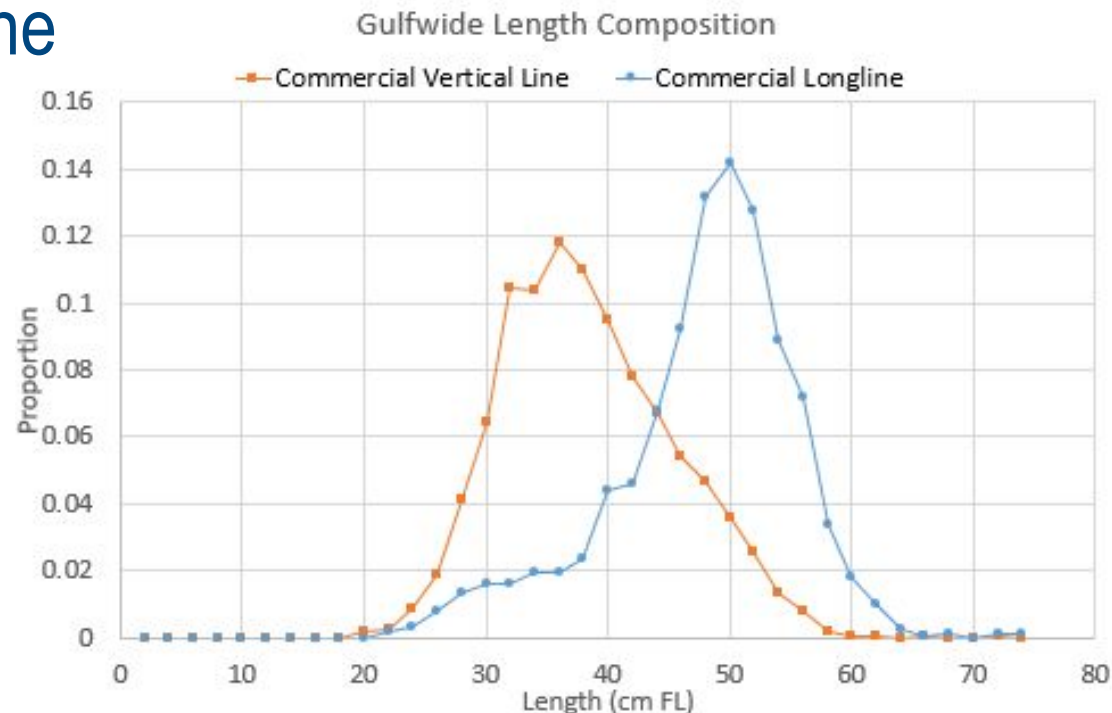


Commercial landings (whole weight)

Data Source	Years	Notes
Annual Landings System (ALS; SEFSC)	1949-2024	Texas - Florida
State Trip Ticket Programs	2014-2024 2000-2024 2015-2024 2002-2024 1986-2017	Texas Louisiana Mississippi Alabama Florida
Historical Landings	1945-1948	Interpolated to a starting value of 0.01 metric tons in 1945

Commercial fleet designation

1. Commercial Vertical Line (i.e., hook and line)
 - Trap & “Other” gears lumped in based on similarities in size distributions (~ 6% of total landings)
2. Commercial Longline



Commercial landings uncertainty

- **1945-1985:** expert opinion
- **1986-2024:** expert opinion values weighted by regional landings

Year	TX	LA	MS	AL	FL-Gulf	Comments
1962-1976	0.20	0.20	0.20	0.20	0.20	Annual state summaries
1977-1985	0.10	0.10	0.10	0.10	0.10	Monthly state summaries
1986-1999	0.10	0.10	0.10	0.10	0.05	FL starts state trip ticket in 1985; used starting in 1986
2000-2001	0.10	0.05	0.10	0.10	0.05	LA starts state trip ticket in 1997; used starting in 2000
2002-2013	0.10	0.05	0.10	0.05	0.05	AL starts state trip ticket and used starting in 2002
2014	0.05	0.05	0.10	0.05	0.05	TX starts state trip ticket in 2008; used starting in 2014
2015-Present	0.05	0.05	0.05	0.05	0.05	MS starts state trip ticket in 2012; used starting in 2015

Recreational landings (numbers)

Data Source	Years	Notes
Marine Recreational Information Program (MRIP)	1981-2024	Continuous time series that uses the Fishing Effort Survey and includes the Access Point Angler Intercept Survey (APAIS) adjustment; excludes shore mode and Monroe County; DW02
Louisiana Creel Survey	2014-2024	Survey began in 2014 Private/shore reported together Calibrated to MRIP-FES units (DW02)
Texas Parks and Wildlife Department (TPWD)	1983-2024	Survey began in 1983; details on data source provided in SEDAR70-WP-03 Calibrated to MRIP-FES units (DW02)
Southeast Region Headboat Survey (SRHS)	1986-2024	Census of logbooks described in Fitzpatrick et al. (2017) DW01
Florida State Reef Fish Survey (SRFS)	1981-2024	Provided but not recommended for use because of other state's contributions to total landings; DW12
Historical	1955-1980	Back-calculated using CPUE (DW03)
Historical	1945-1954	Interpolated to a starting value of 1,250 fish in 1945

Recreational fleet designation

1. Charter, private and headboat modes combined due to similarities in length and age compositions

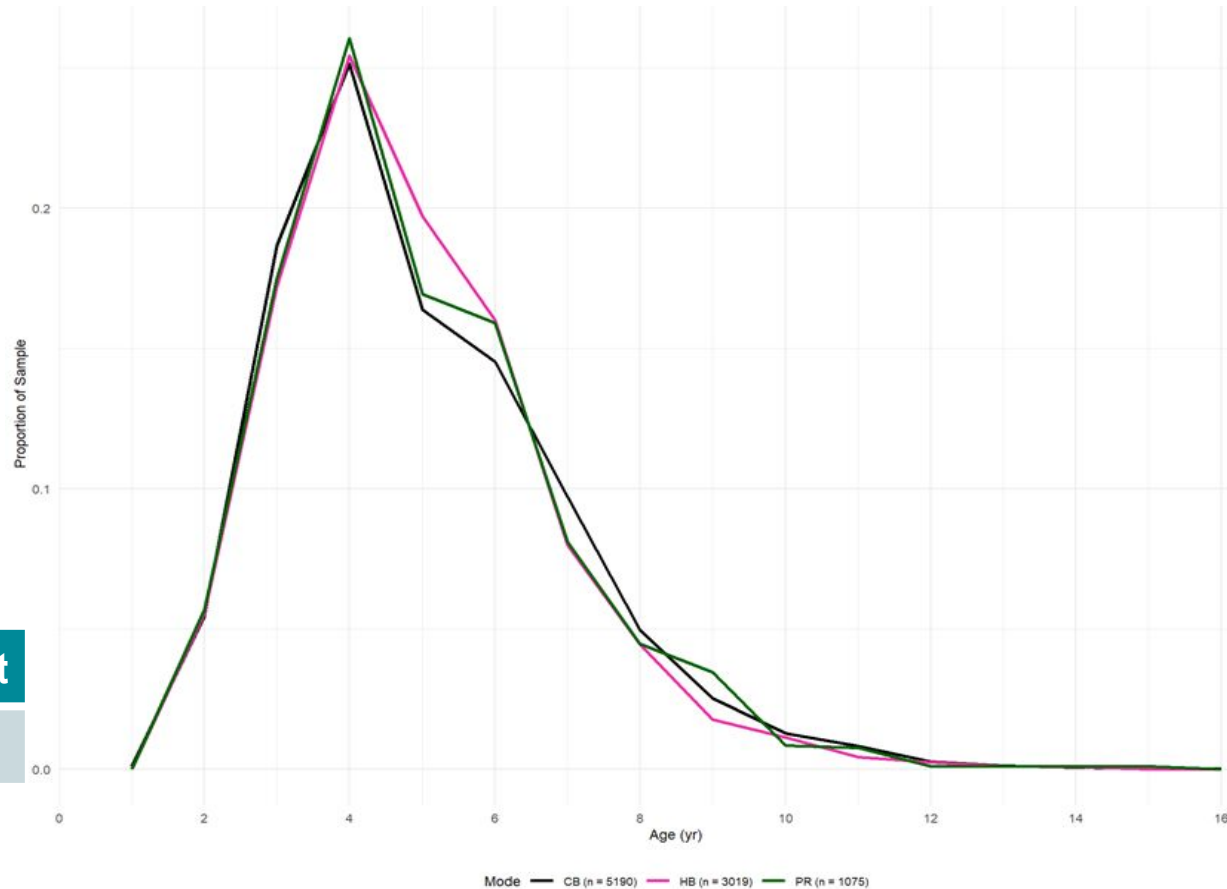
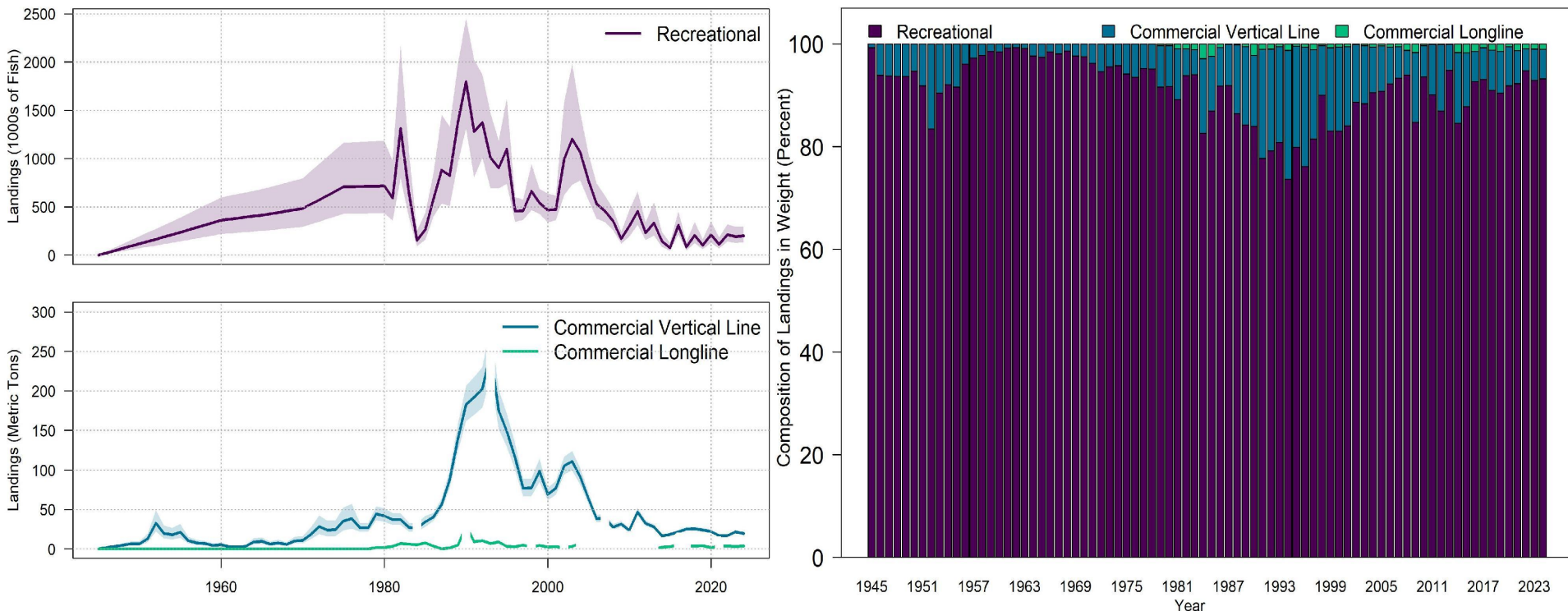


Figure 4.13.9. Nominal age distribution of Gray Triggerfish from the charter (CB), headboat (HB), and private (PR) modes.

Landings comparison

- Consistently dominated by recreational fleet



- Confidential commercial data have been removed

Inclusion of recreational landings

- Input as numbers of fish here and consistently in previous Gulf assessments
 - Recreational surveys designed to sample numbers, weight information incomplete ([Dettloff and Matter 2019](#))
 - Weight estimation approach developed following implementation of annual catch limits for use by management ([Matter and Turner 2010](#))
 - Multiplies numbers by average weights by strata

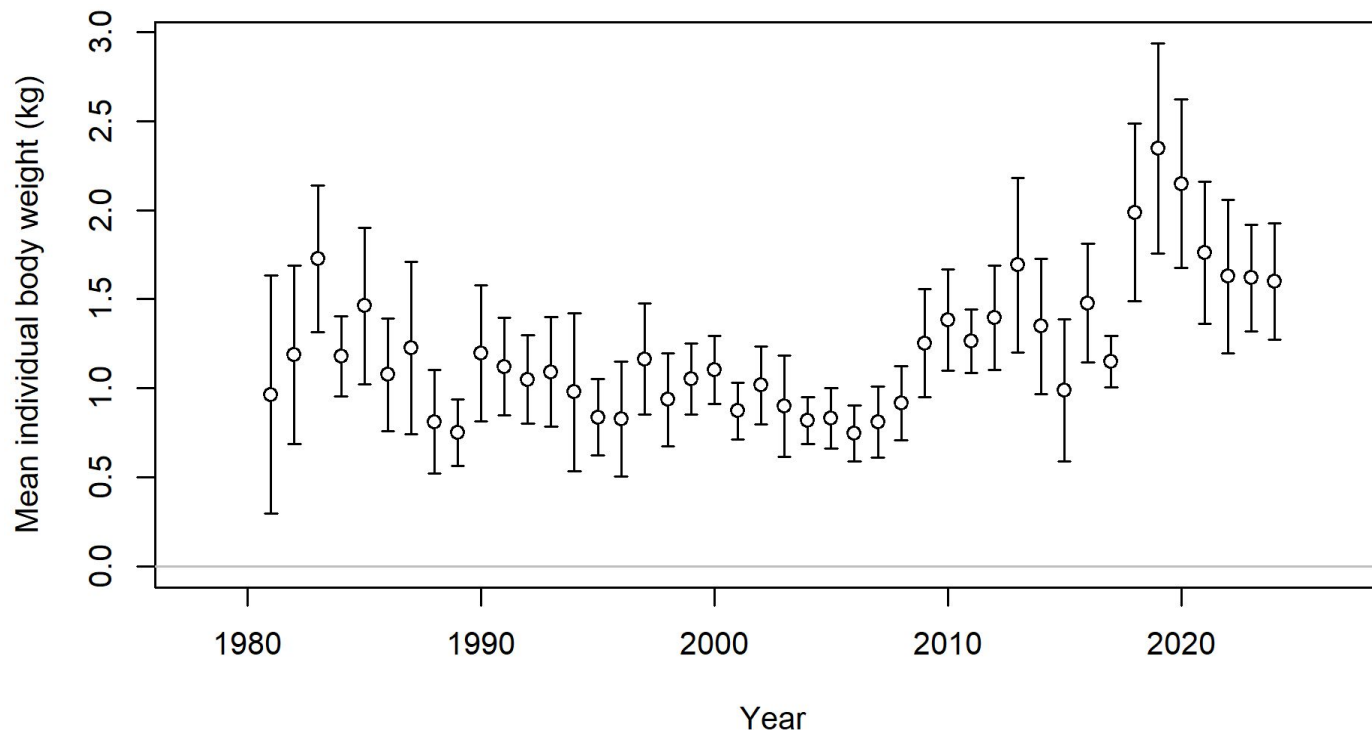
Species	Region	Year	State	Mode	Wave	Area Fished
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Mean weight of recreational landings

- Fit to mean weight landed for the recreational fleet

$$MW_{year} = \frac{Weight\ estimate_{year}}{Numbers\ estimate_{year}}$$

- Accompanying error estimates provided in [DW02](#)

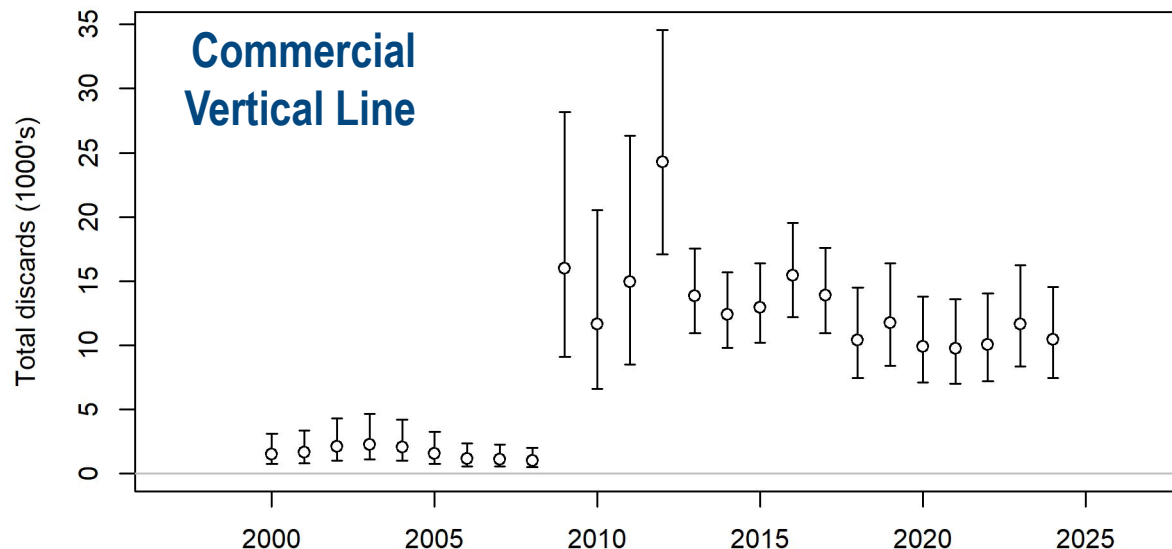


Commercial discards

- Catch per unit effort (CPUE) expansion approach to calculate total catch

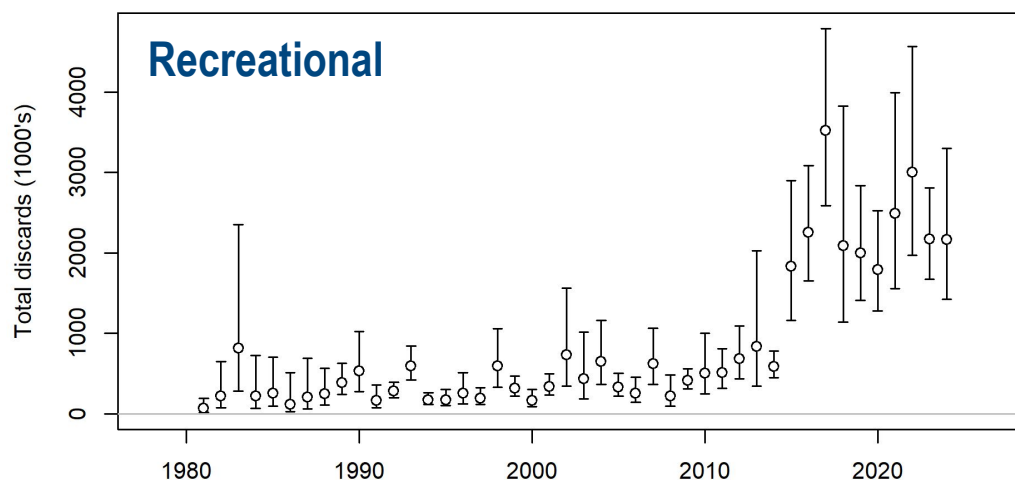
$$\text{total Catch} = \frac{\text{Catch}}{\text{Effort}} \times \text{Total Effort}$$

- CPUE data from NMFS Reef Fish Observer Program
- Total Effort from NMFS Commercial Reef Logbooks



Recreational discards

Data Source	Notes
MRIP	Self-reported discards, High CVs (DW02)
LA Creel	Calibrated to MRIP-FES units (DW02)
TPWD	Discards not reported by TPWD; Discards imputed and calibrated to MRIP-FES units (DW02)
SRHS	Self-reported 2008-2024; 1986-2007 estimated using the Super-Ratio approach (DW08)
SRFS	Provided but not recommended for use; DW12



Shrimp bycatch

Data Workshop

Assessment Process

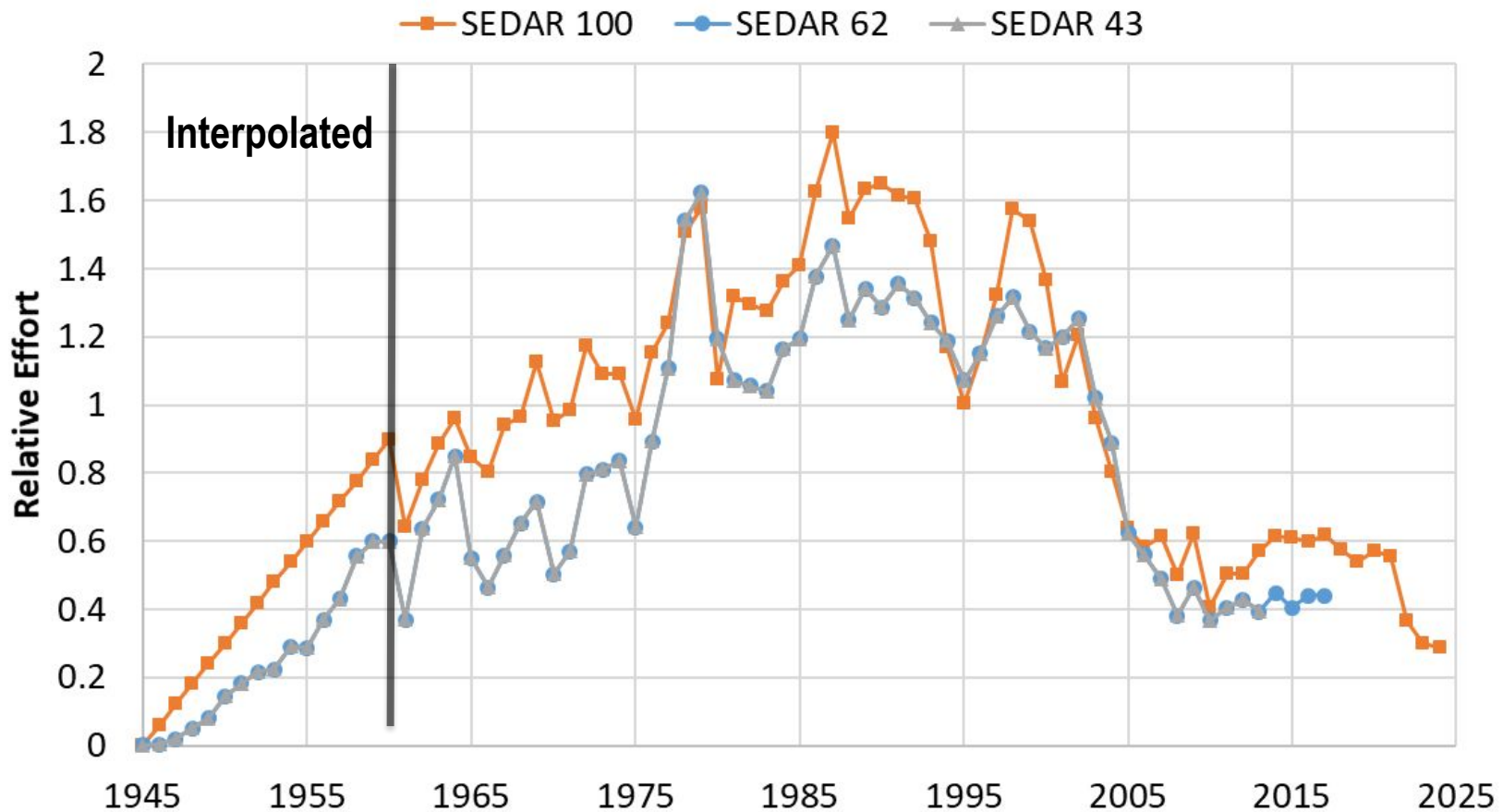
6. Utilize the new estimates of shrimp fishery effort and bycatch, as appropriate, based on the peer review of such data from SEDAR 87 and subsequent analyses.
7. Document any change in start year from previous assessments
 - Evaluate the existing composition data and recommend whether the data are sufficient to represent the bycatch by the fleet.

- Explore shrimp trawl bycatch magnitude and age-structure, if data are available using new effort and bycatch methodologies (e.g., SEAMAP Summer and Fall Groundfish trawls and shrimp observer data).

- Old bycatch estimation approach no longer supported
- New methodology being proposed for estimation of gray triggerfish (a “stop-gap” approach)
 - Unable to use [method developed for red snapper](#)

Shrimp effort: 1945-2024

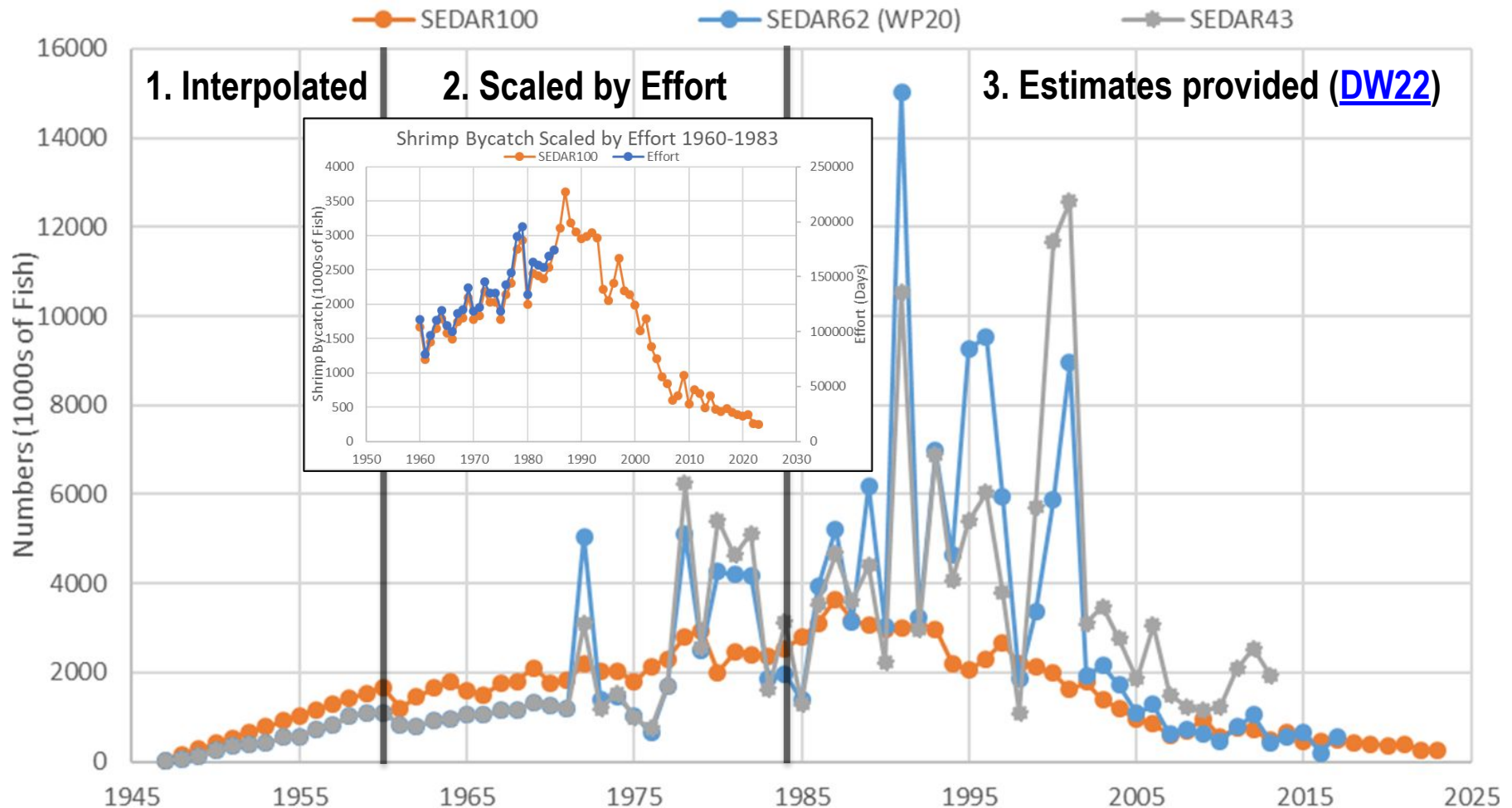
- Effort in days provided from 1960-2024
- Relative index of days (scaled to mean of 1)



Shrimp bycatch estimation approach

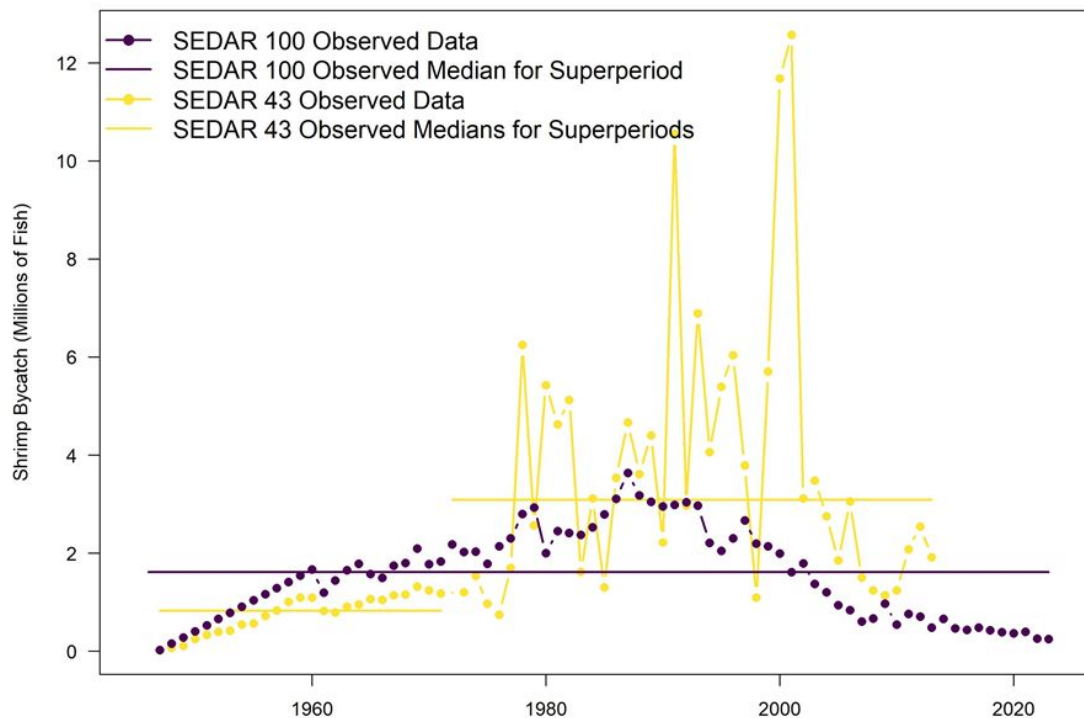
- Three methods used

Table 10: Adjusted
SEDAR 62 GT values



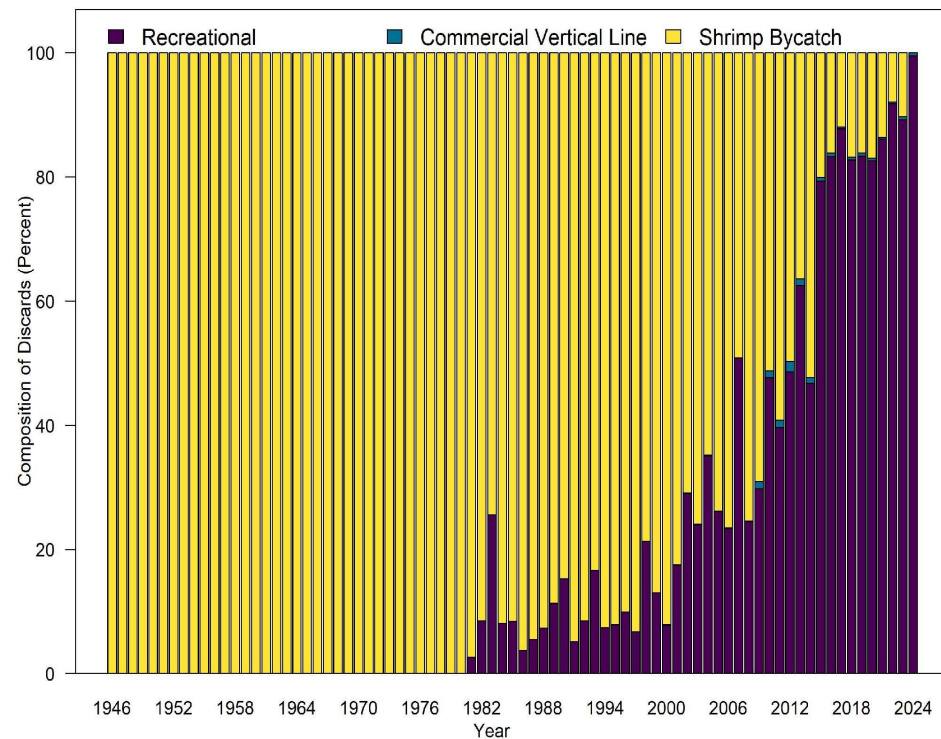
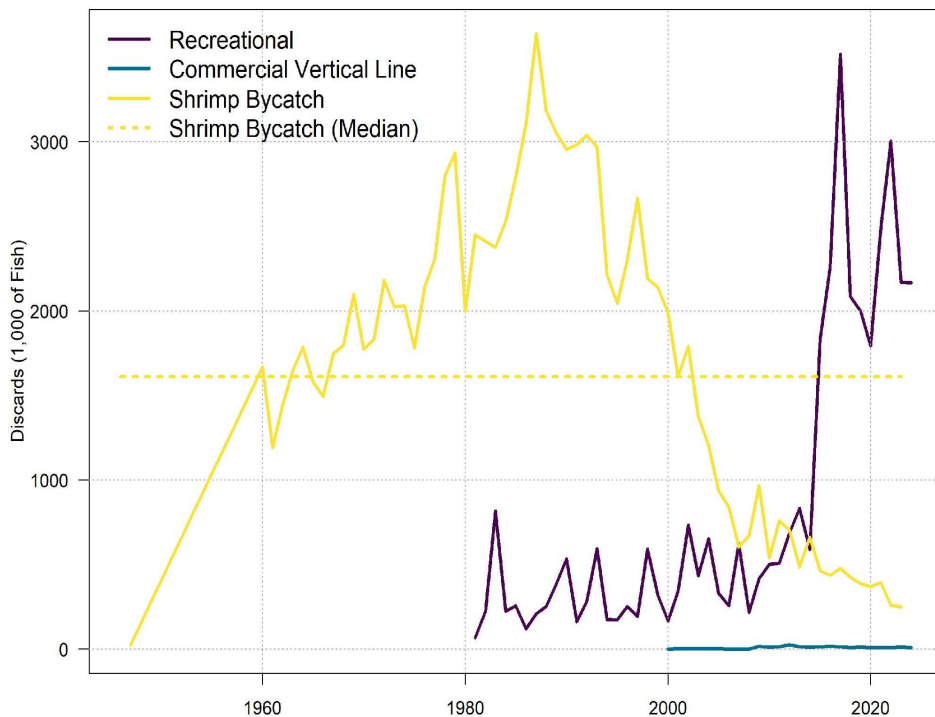
Shrimp bycatch estimates

- Fit to median value of all available data (1947-2023) using the super-period approach in Stock Synthesis
 - Inter-annual variability not trusted



Discard comparison

- Shrimp bycatch dominates discards until the recreational fishery discards ramp up around 2010



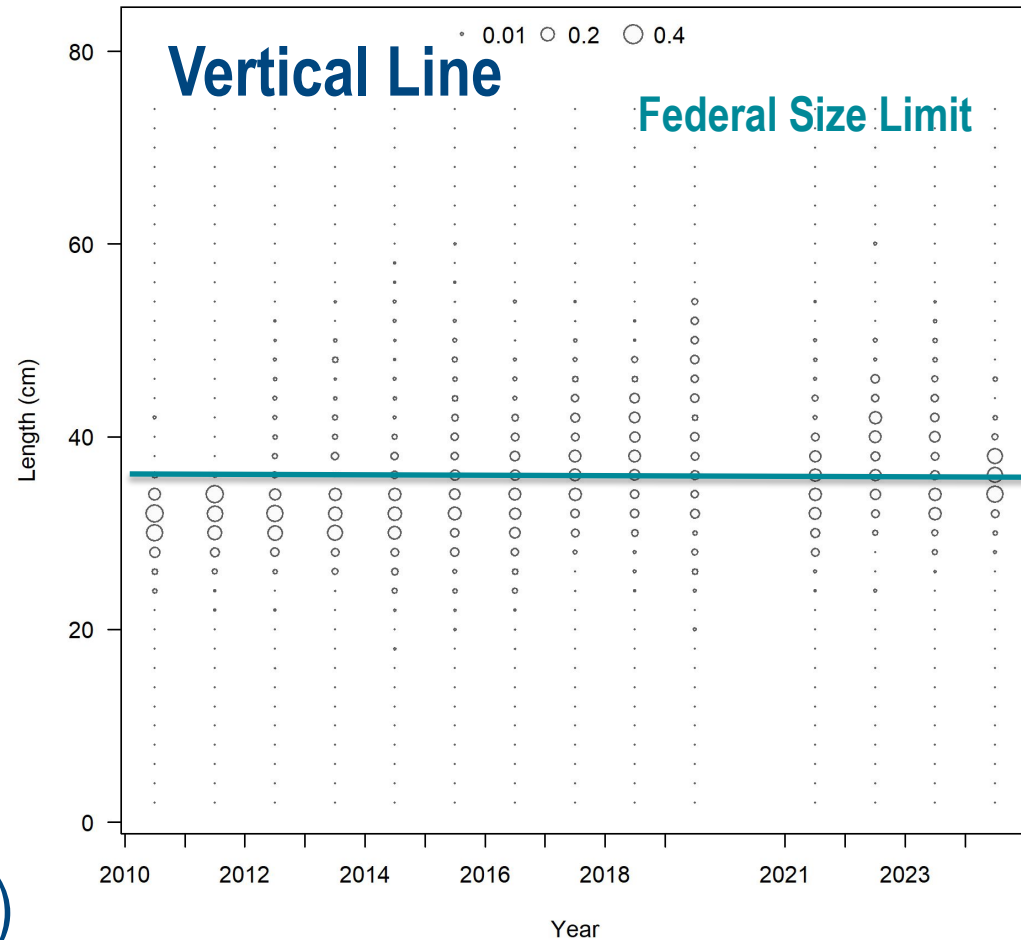
Outline

- Data Review
 - Stock definition
 - Assessment history
 - Regulations
 - Key data decisions
 - Life history
 - Removals
 - **Size compositions**
 - Age compositions
 - Indices
 - Survey length composition



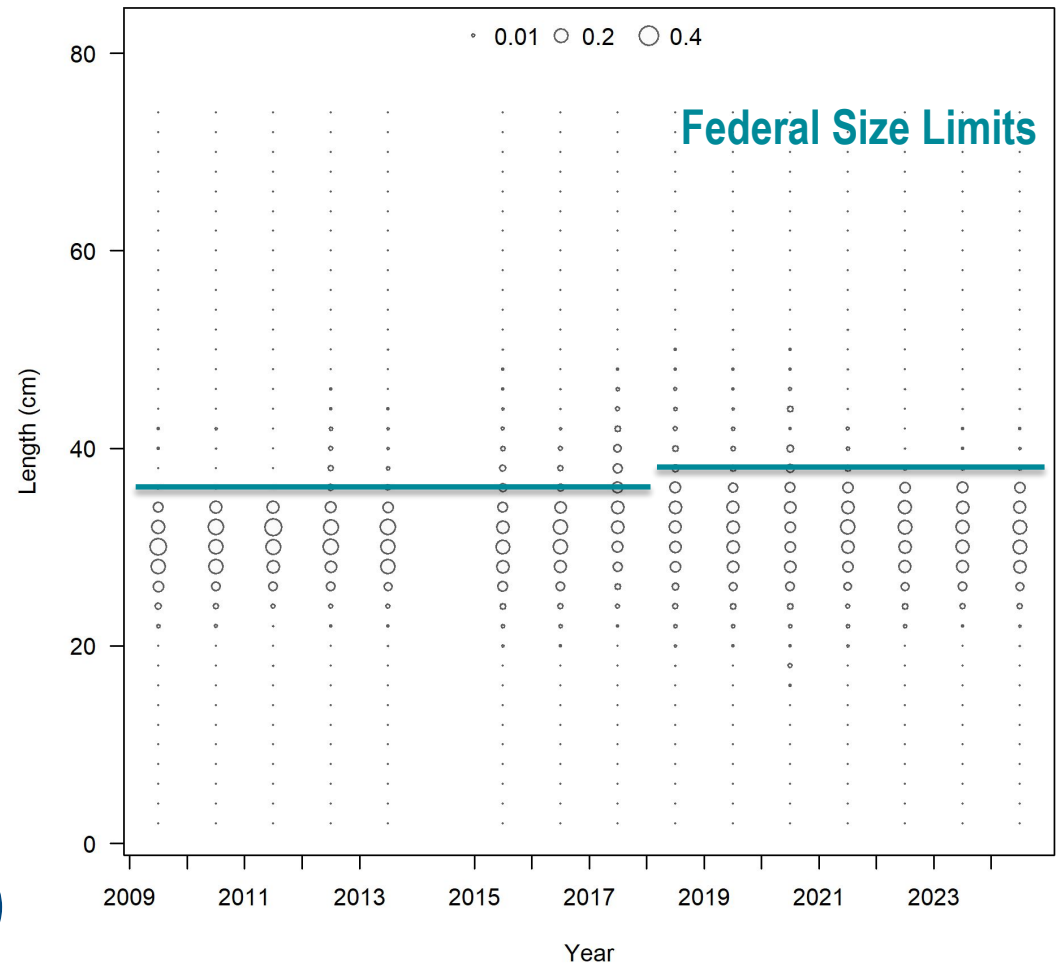
Commercial length compositions - discards

- NMFS Reef Fish Observer Program
 - Collects specific catch and bycatch information for selected vessels and information collected includes trip, gear, and geographic characteristics
 - Input sample sizes are the number of trips (≥ 10)



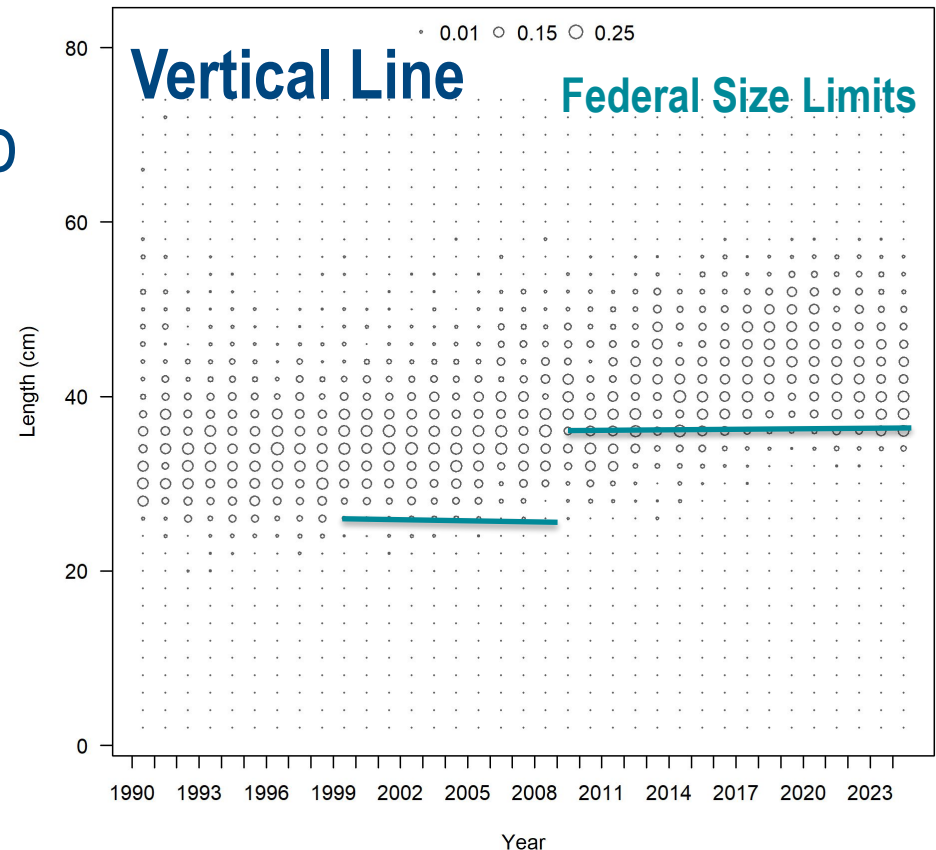
Recreational length compositions - discards

- Data obtained from FWRI ([DW11](#)), AL, & MS At-sea Observer Programs and aggregated into North and South
 - Weighted by discard estimates between sub-regions
 - Cooperative vessels randomly selected year-round for observer coverage
 - Input sample sizes are the number of trips (≥ 10)



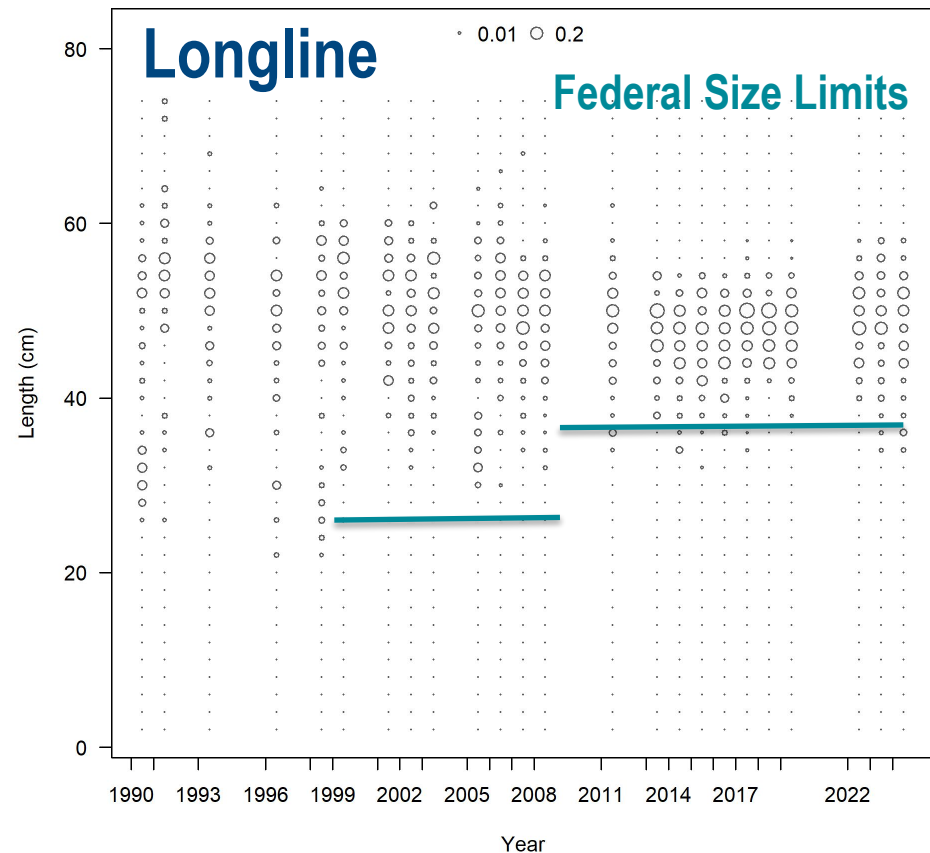
Commercial length compositions - landings

- Data obtained from the trip intercept program (TIP) and GulfFIN and aggregated into West and East
 - Weighted based on the distribution of landings estimates between sub-regions
 - Input sample sizes are the number of trips (≥ 10)



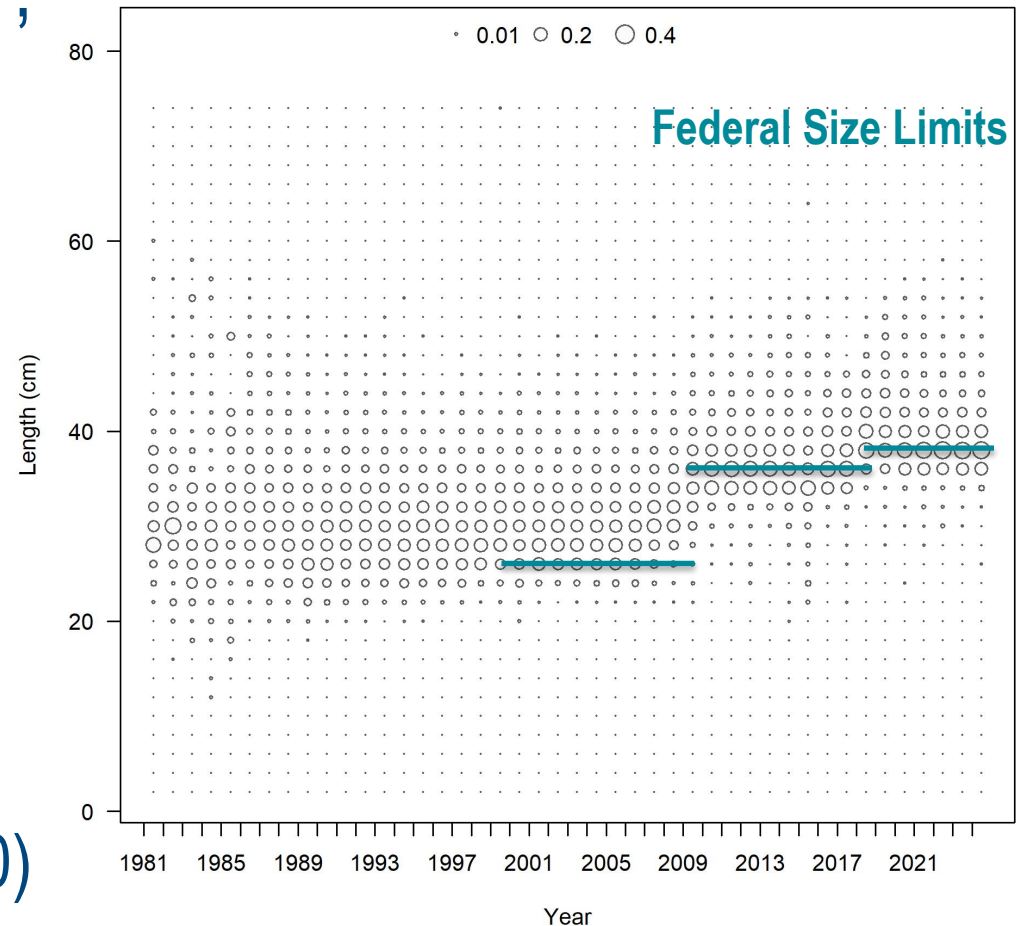
Commercial length compositions - landings

- Data obtained from the trip intercept program (TIP) and GulfFIN and aggregated into West and East
 - Weighting by sub-regions not feasible due to paucity of data from West for Longline
 - Input sample sizes are the number of trips (≥ 10)



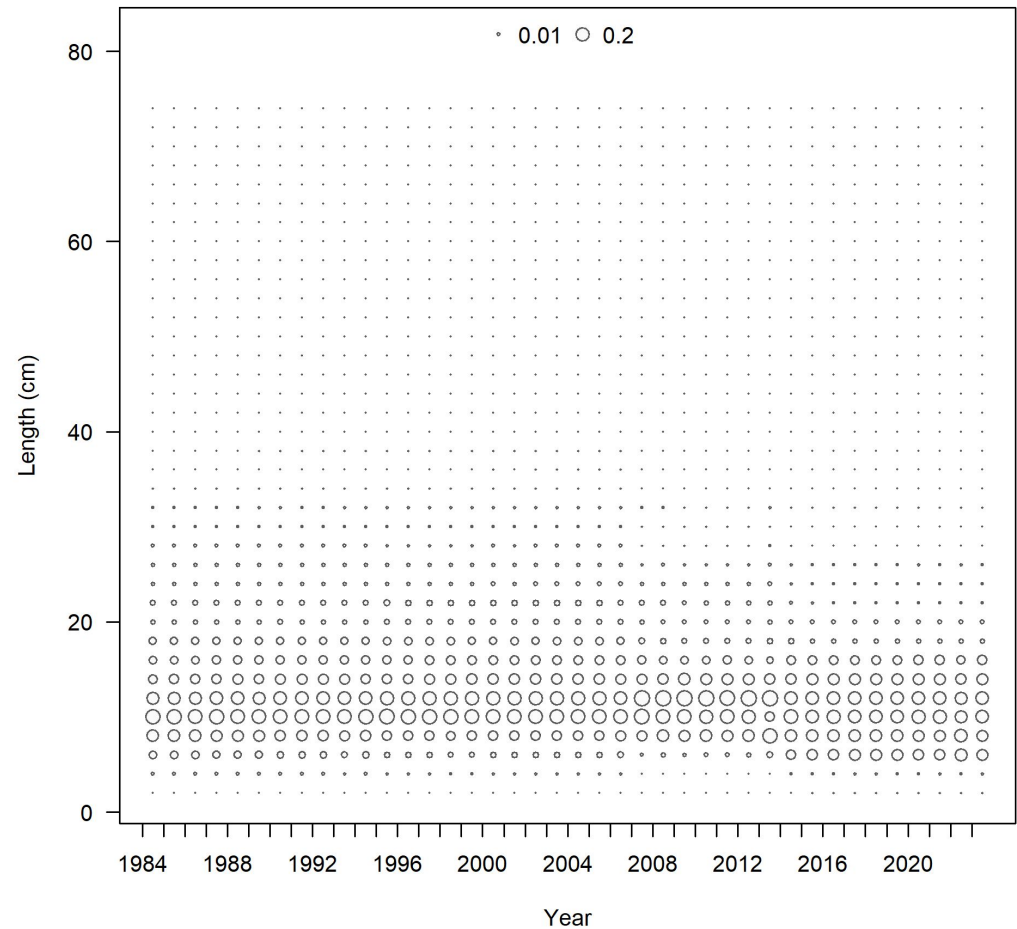
Recreational length compositions - landings

- Data obtained from MRIP, TPWD, SRHS and GulfFIN and aggregated into West and East
 - Weighted based on the distribution of landings estimates between sub-regions
 - Input sample sizes are the number of trips (≥ 10)



Shrimp bycatch proxy length compositions

- Filtered SEAMAP trawl length frequencies used as a proxy for bycatch lengths
- Composition calculated using the estimates of bycatch
 - Included as a check of expected composition (not in likelihood)



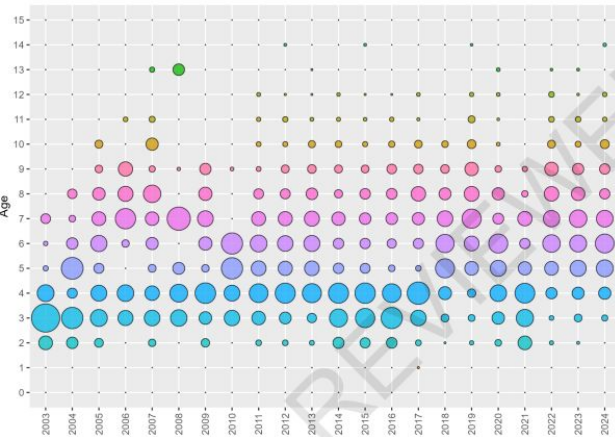
Outline

- Data Review
 - Stock definition
 - Assessment history
 - Regulations
 - Key data decisions
 - Life history
 - Removals
 - Size compositions
 - **Age compositions**
 - Indices of abundance
 - Survey length composition

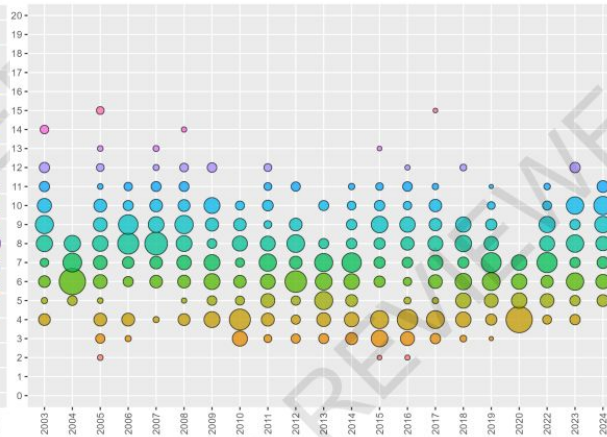
Age compositions

- Nominal and weighted age compositions (by length compositions) were provided for commercial ([DW07](#)) and recreational fleets ([DW04](#))
 - No clear cohort signals in the age data, likely due to the large variability in age-at-length

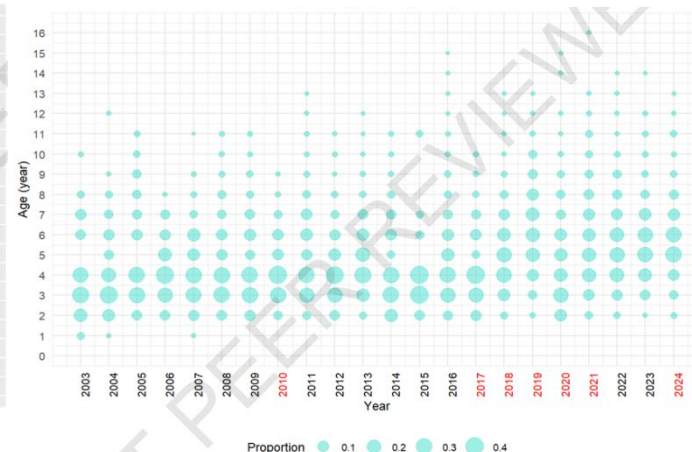
Com Vertical Line (weighted)



Com Longline (nominal)



Recreational (weighted)



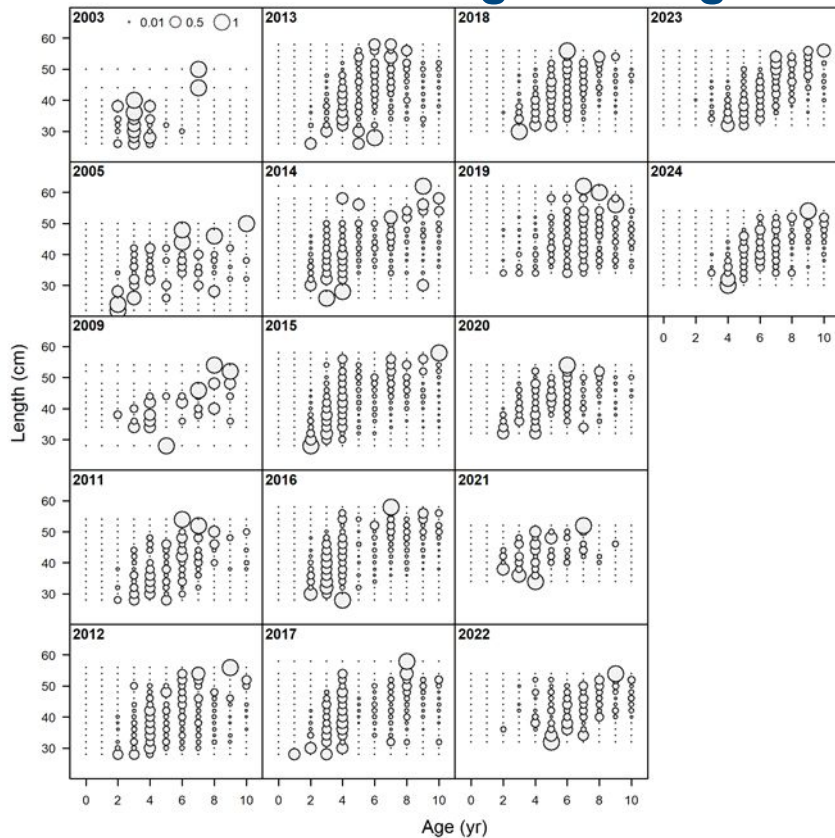
Conditional age-at-length

- Input conditional age-at-length for each fleet to accompany length compositions of both discards and landings
 - Avoids double use of fish for both age and size information - age conditional on length
 - Contains more detailed information about the relationship between size and age – can estimate growth
 - Can directly match the protocols of the sampling program when age data are collected in a length-stratified program

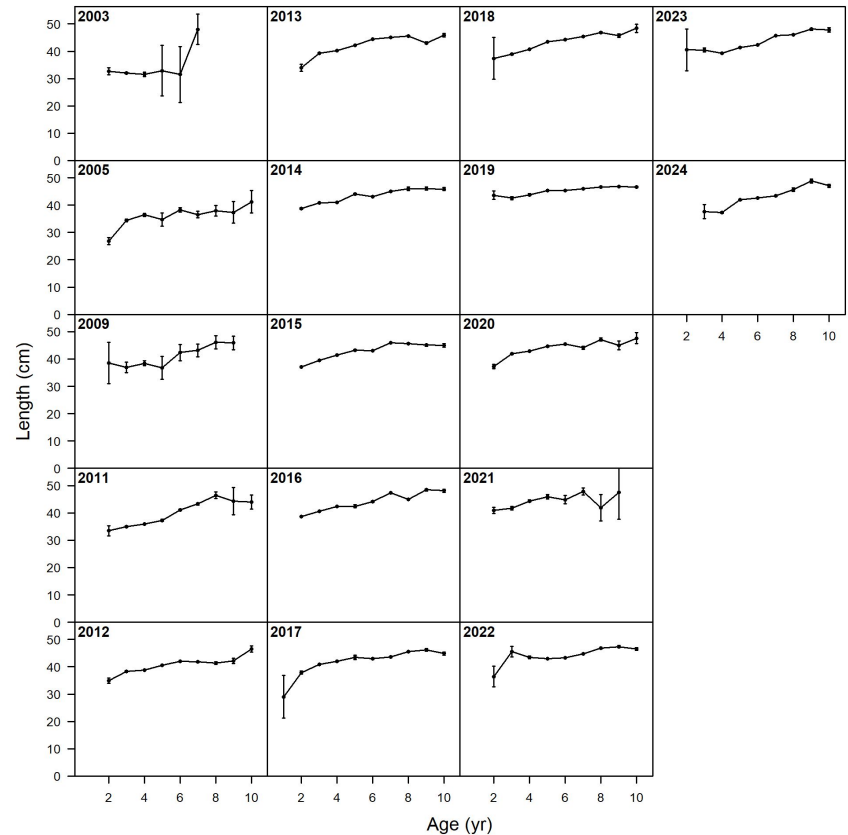
Commercial Vertical Line

- Observed mean length-at-age included in model as a check of expected mean length-at-age (not in likelihood)

Conditional age-at-length



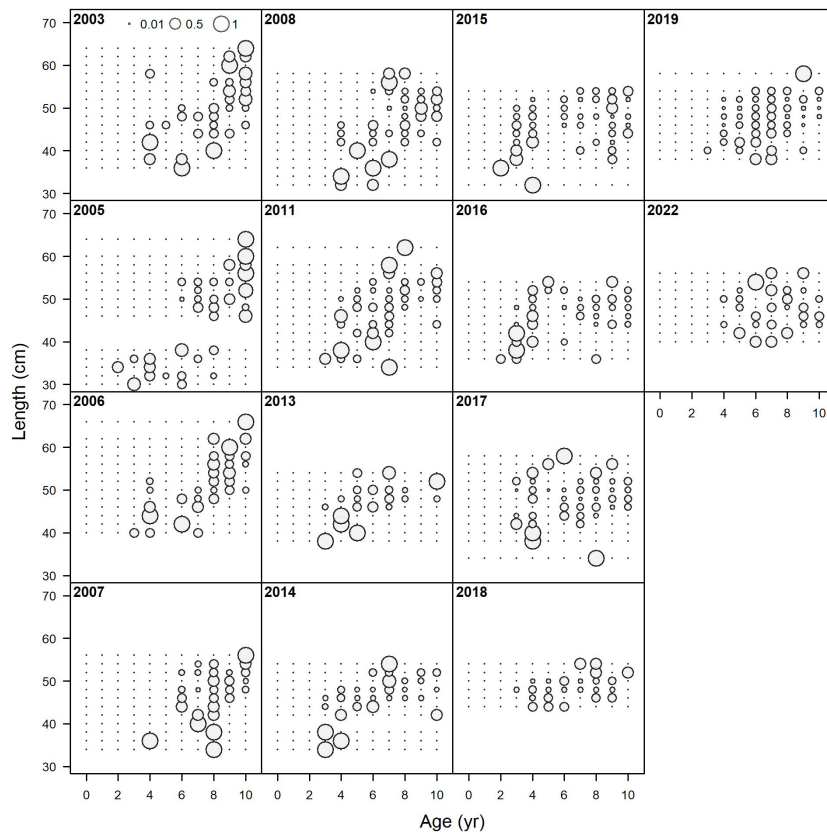
Mean length-at-age



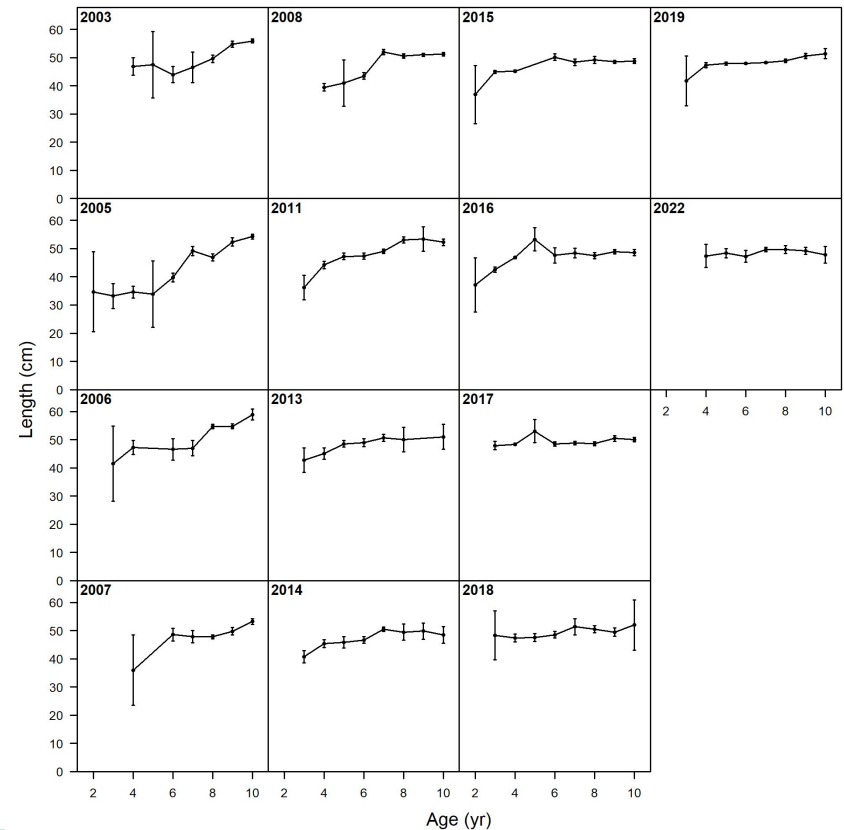
Commercial Longline

- Observed mean length-at-age included in model as a check of expected mean length-at-age (not in likelihood)

Conditional age-at-length



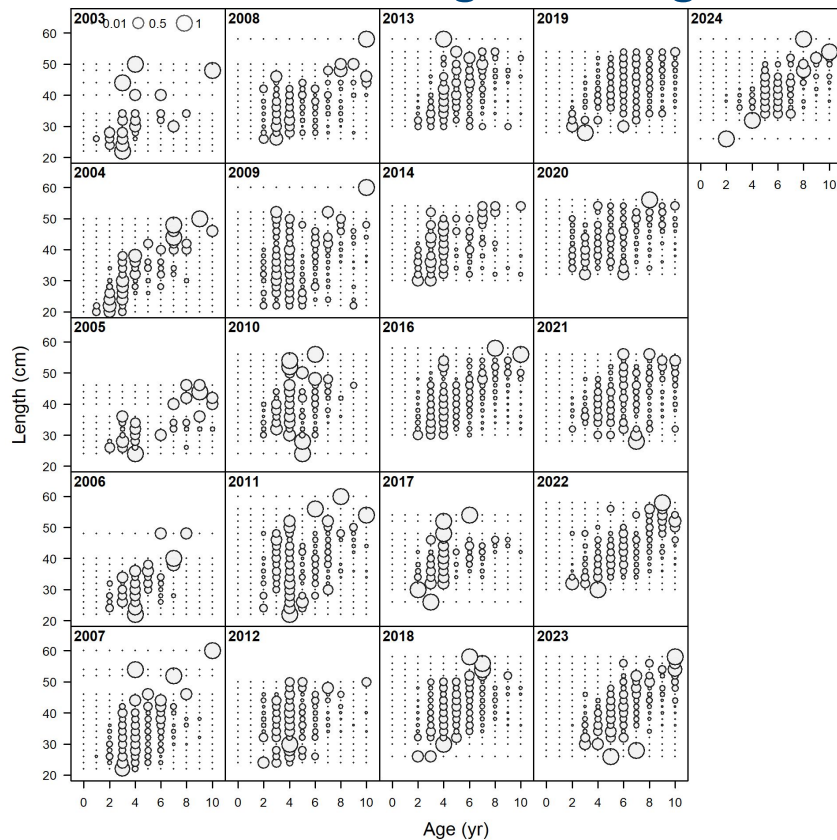
Mean length-at-age



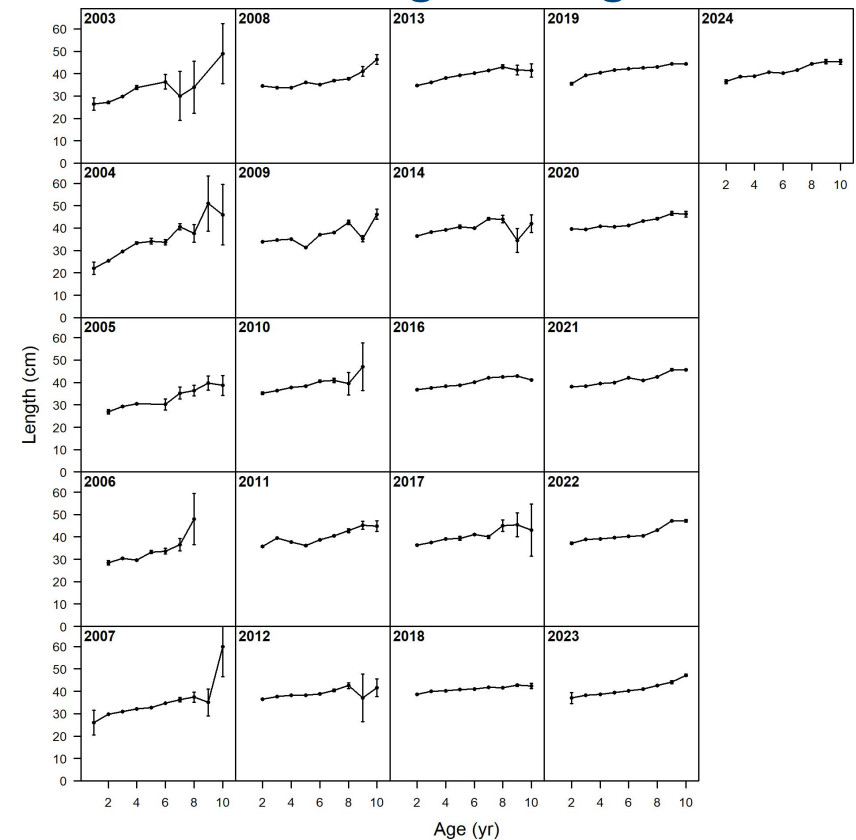
Recreational

- Observed mean length-at-age included in model as a check of expected mean length-at-age (not in likelihood)

Conditional age-at-length



Mean length-at-age



Outline

Data Workshop

Assessment Process

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 - Size compositions
 - Age compositions
 - **Indices of abundance**
 - Survey length composition

4. Provide fishery-independent measures of population abundance developed through the terminal year where possible.
 - Evaluate the G-FISHER composite video index for use in the assessment.
 - Consider any changes to the fishery-independent indices comprising the GFISHER index as provided for the previous assessment and evaluate the representativeness through time of the composition data.
 - Evaluate the compositions available. Recommend modifications needed to inform differences in catchability and selectivity of the surveys.
 - Provide appropriate measures of uncertainty for all fishery-independent abundance indices and effort time series considered.

- Explore the use of a combined video index from the FWRI, Pascagoula, and Panama City video surveys (e.g., G-FISHER). Recommend modifications needed to inform differences in catchability and selectivity of the surveys.



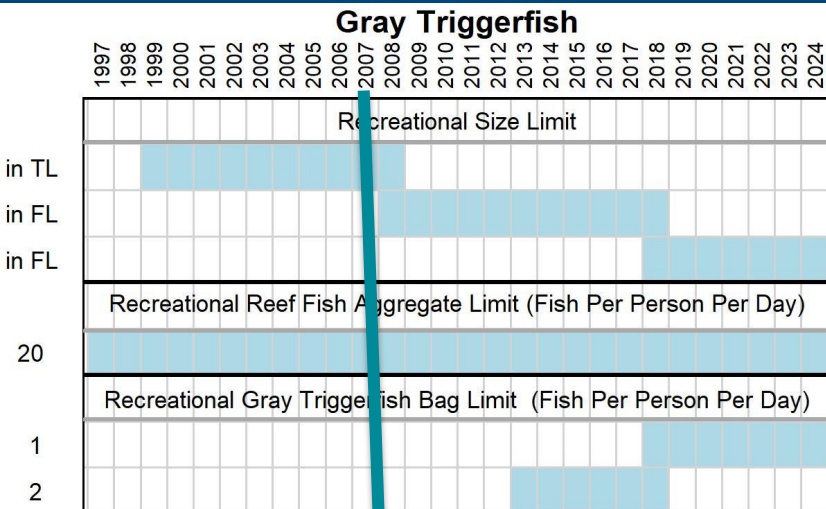
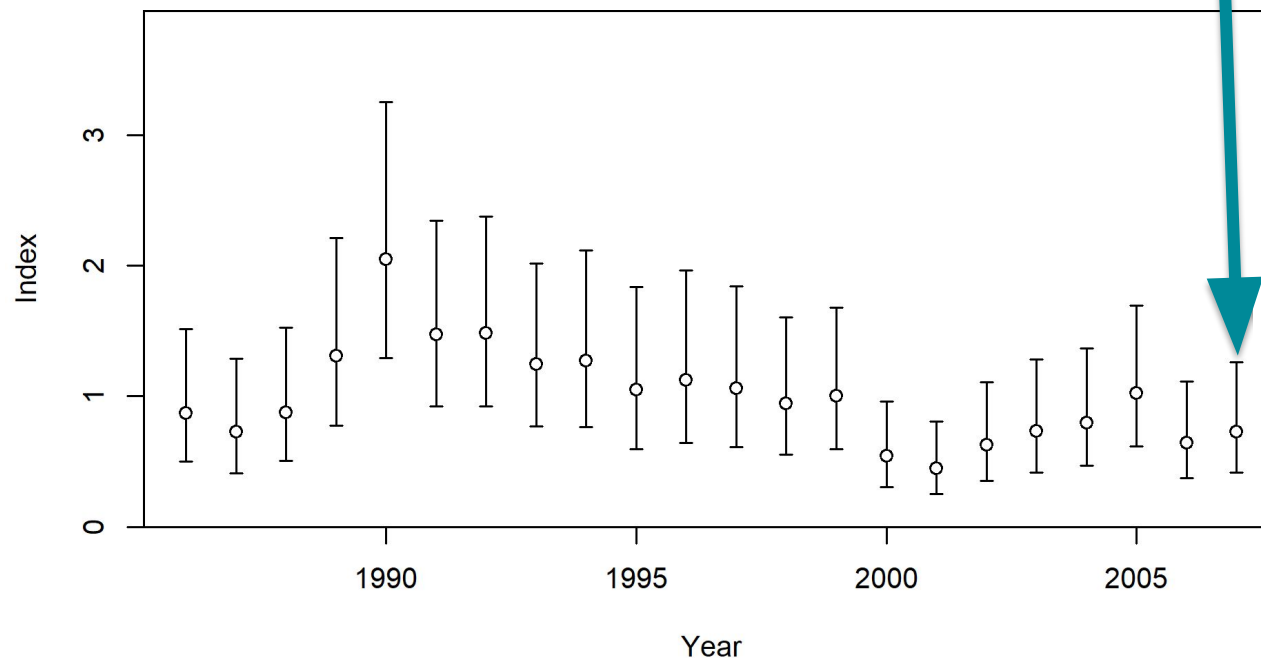
Indices of relative abundance

Data Source	Recommended and caveats
Commercial Vertical Line CPUE (DW15)	No; likely not reflective of population trends due to regulations
Recreational (SRHS) CPUE (DW09)	Yes, but truncate in 2007 due to regulations (likely not reflective of population trends after)
SEAMAP Trawl Early (1987-2008) Survey (DW16)	Yes; combine Summer + Fall since size compositions are similar
SEAMAP Trawl Late (2009-2024) Survey (DW16)	Yes; combine Summer + Fall since size and age compositions are similar
Combined Video Survey (DW18)	Yes
SEAMAP Fall Larval Survey (DW19)	No; does not track larvae and use as juvenile index would be redundant of trawl survey

- CV converted to SE: $\log_e(SE) = \sqrt{(\log_e(1 + CV^2))}$

Fishery-dependent Recreational (SRHS) CPUE

- Landings only index
- Selectivity mirrored to the recreational fleet

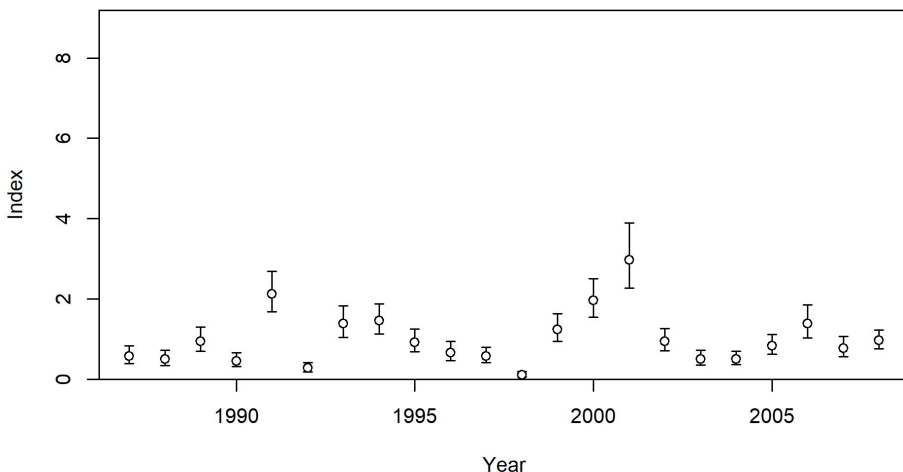


DW09

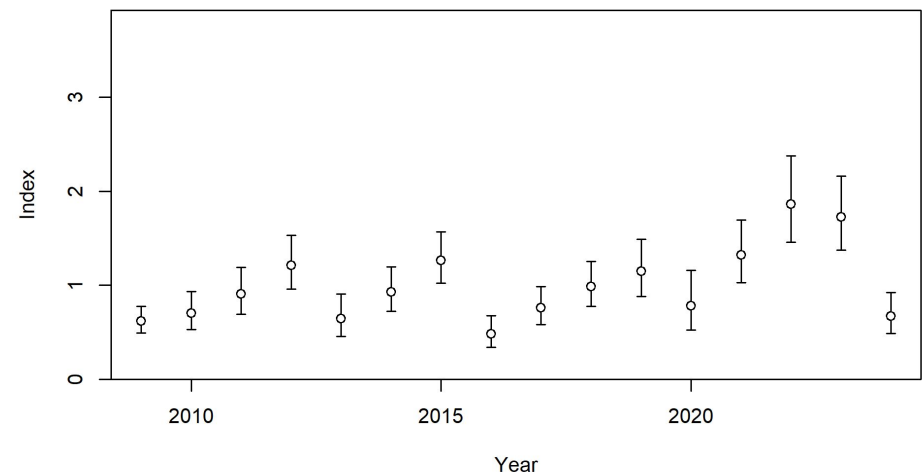
Fishery-independent: SEAMAP trawl survey

- Index split 1987-2008 and 2009-2024 due to major survey configuration changes and areas sampled
- Recommended combining Summer + Fall because of similar size distributions and data limitations

SEAMAP Trawl Early



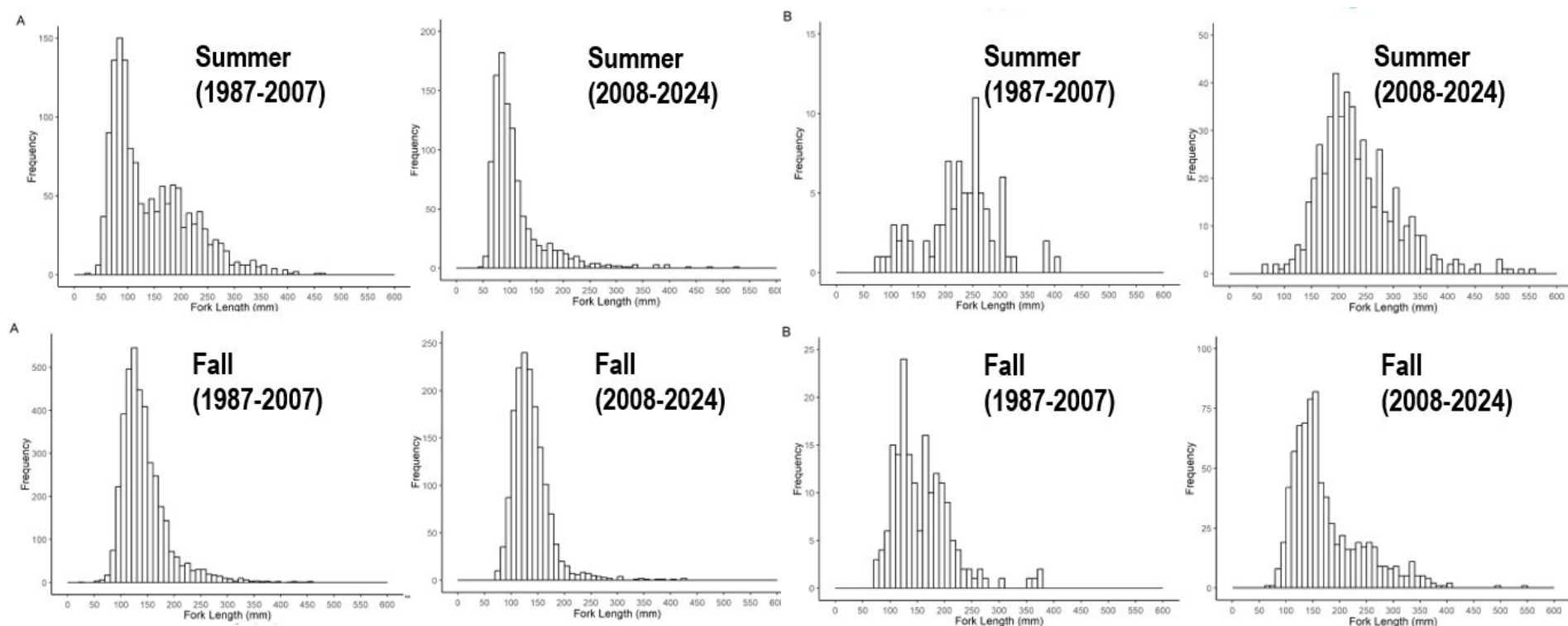
SEAMAP Trawl Late



SEAMAP trawl length compositions

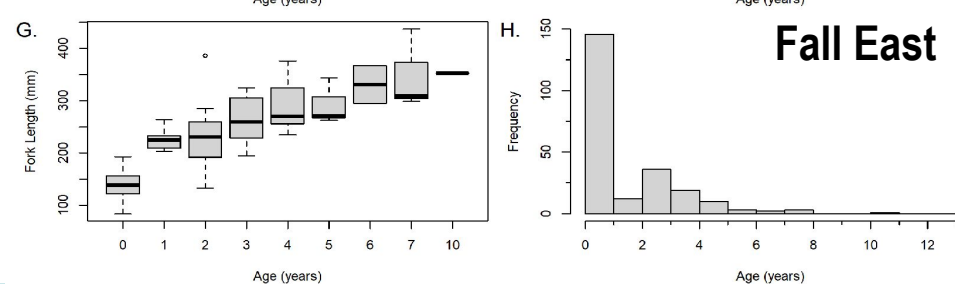
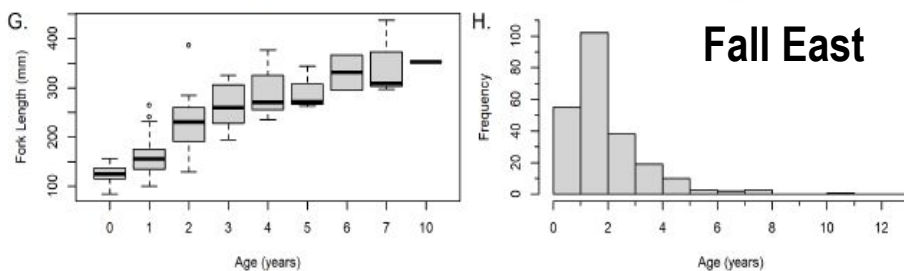
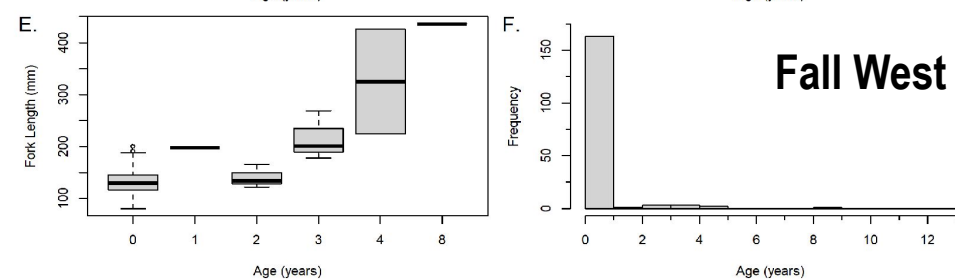
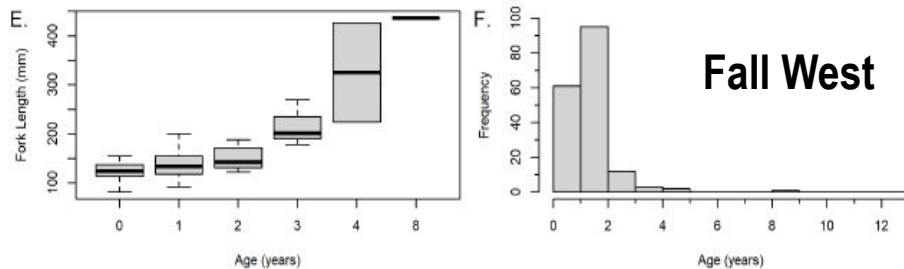
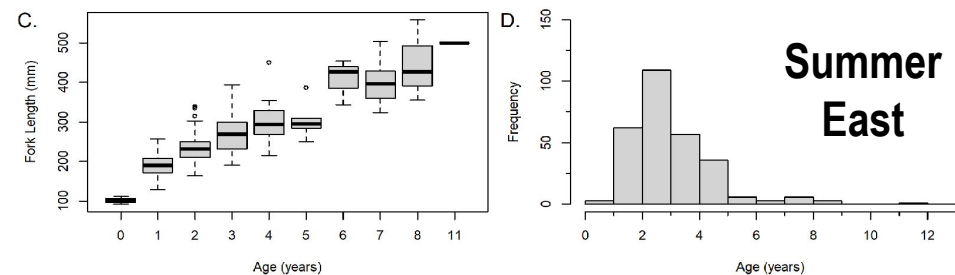
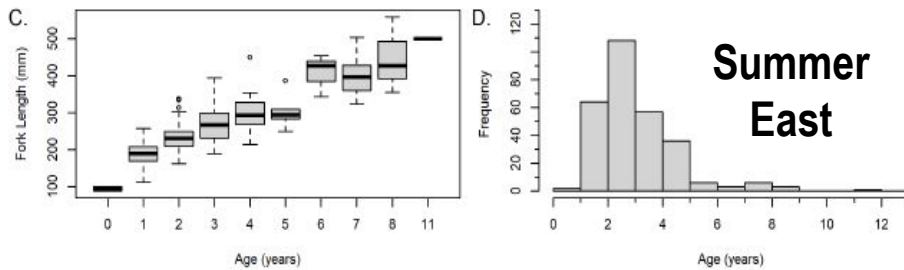
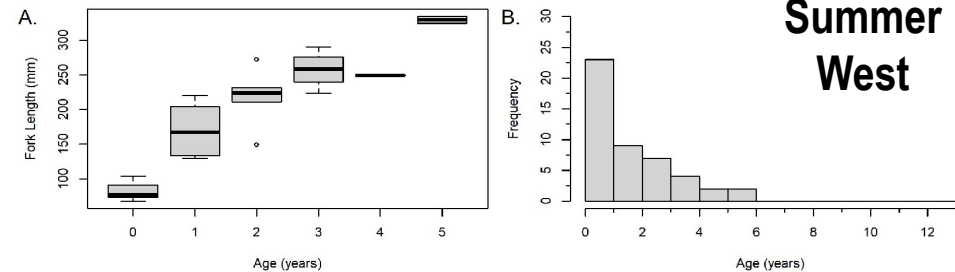
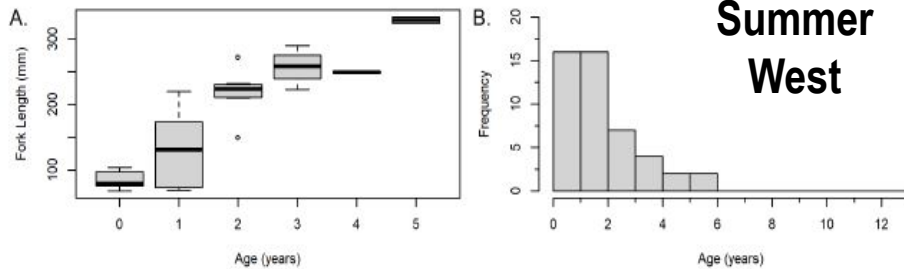
West

East



SEAMAP trawl age compositions (2008+)

After re-evaluating age 0-1 data



Fishery-independent: video survey

- Major revamp of combined index development through the **G-FISHER project** using habitat based approach
 - Account for both differences in habitat classes sampled by each survey and the overall survey footprints

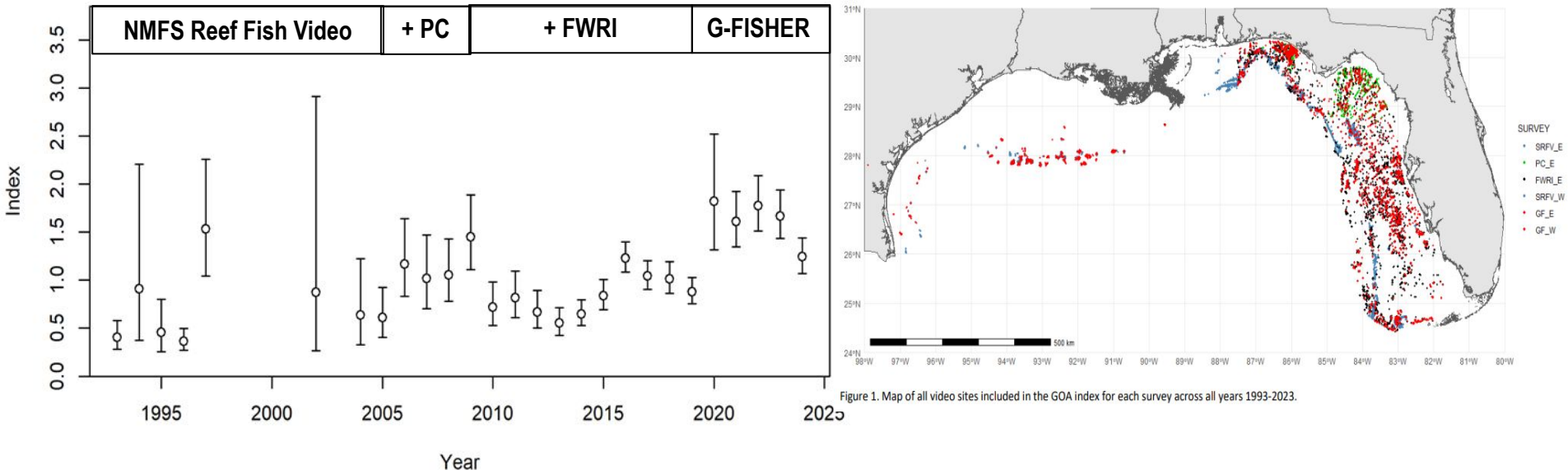


Figure 1. Map of all video sites included in the GOA index for each survey across all years 1993-2023.

SEAMAP Fall plankton survey

- Not supported for larval index for tracking SSB
- Indices from neuston nets primarily represent the recruitment of juvenile fishes to Sargassum habitat, not the recruitment to the gray triggerfish population
 - Trawl survey samples these juveniles once they have settled

DW19

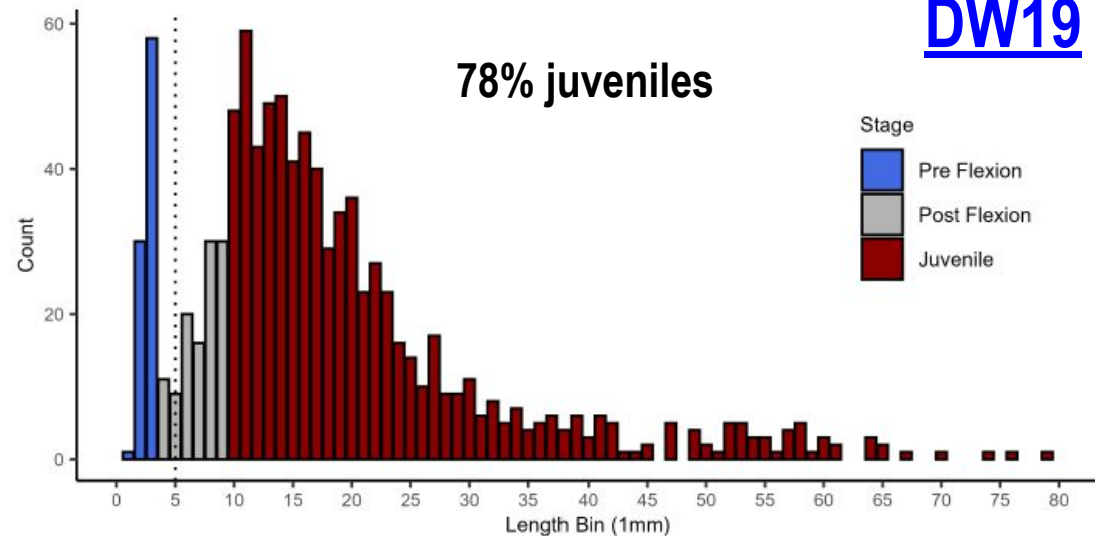


Figure 3. Length frequencies of gray triggerfish from neuston net samples collected during the SEAMAP Fall Plankton surveys. Length data includes all samples used to generate indices of relative abundance for the entire Gulf of America.

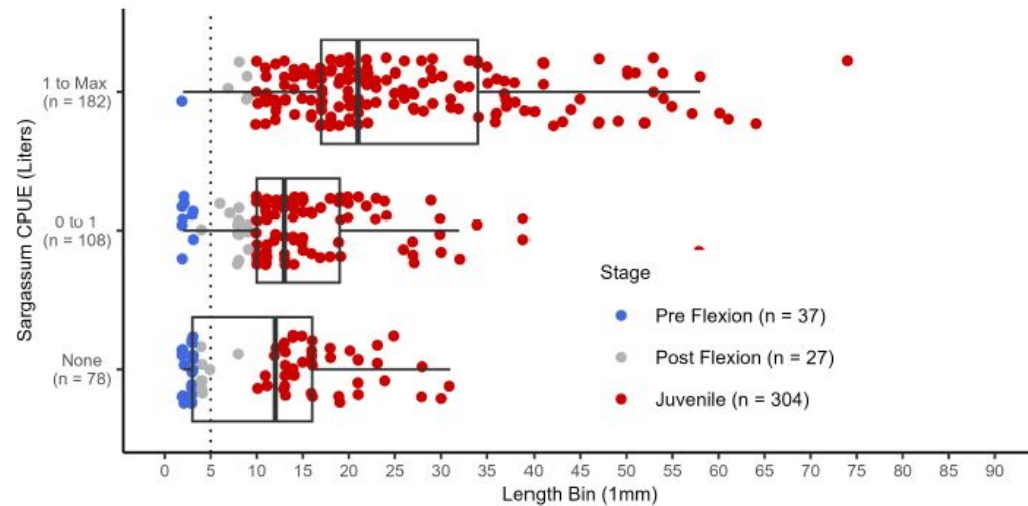


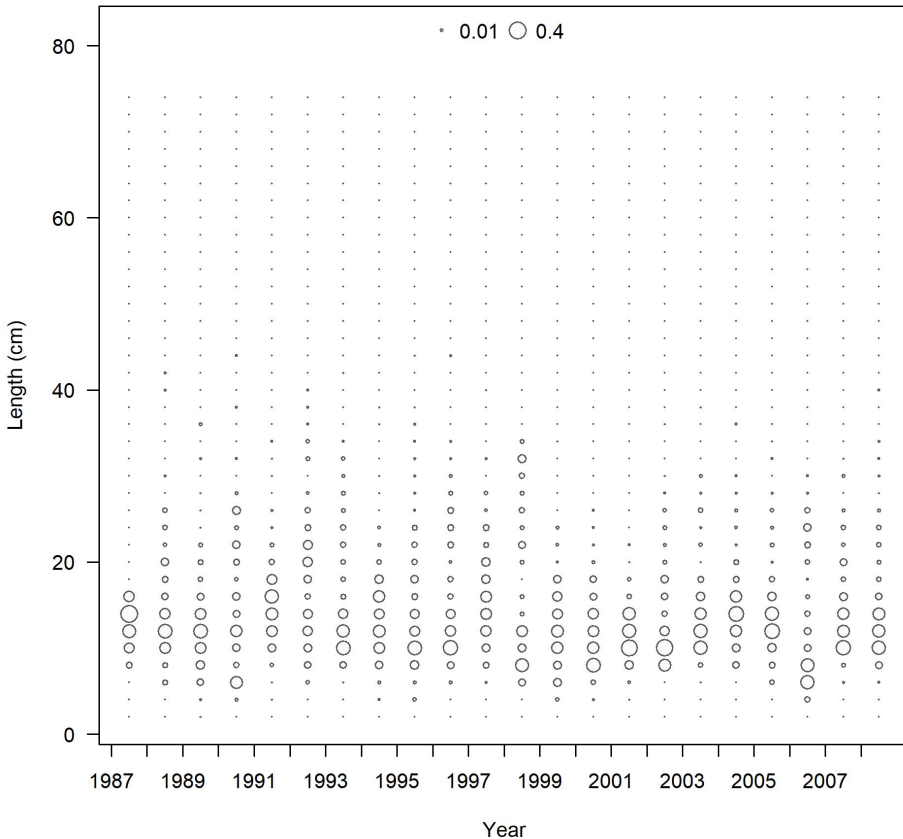
Figure 4. Lengths of gray triggerfish from neuston net samples collected during the SEAMAP Fall Plankton surveys for which sargassum data is available from 2006 to 2022 Gulf of America index samples.

Outline

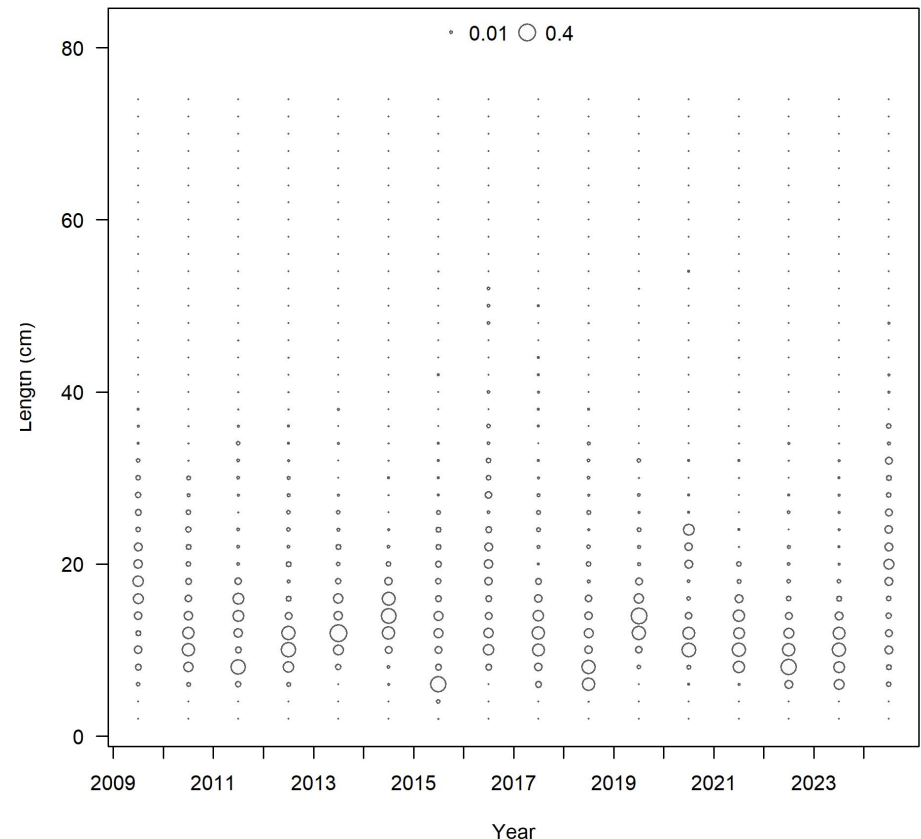
- Data Review
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 - Removals
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 - Age compositions
 - Indices of abundance
 - **Survey length composition**

Survey length composition: SEAMAP trawl

SEAMAP Trawl Early



SEAMAP Trawl Late



- Input sample sizes = number of stations (≥ 10)

Survey length composition: video

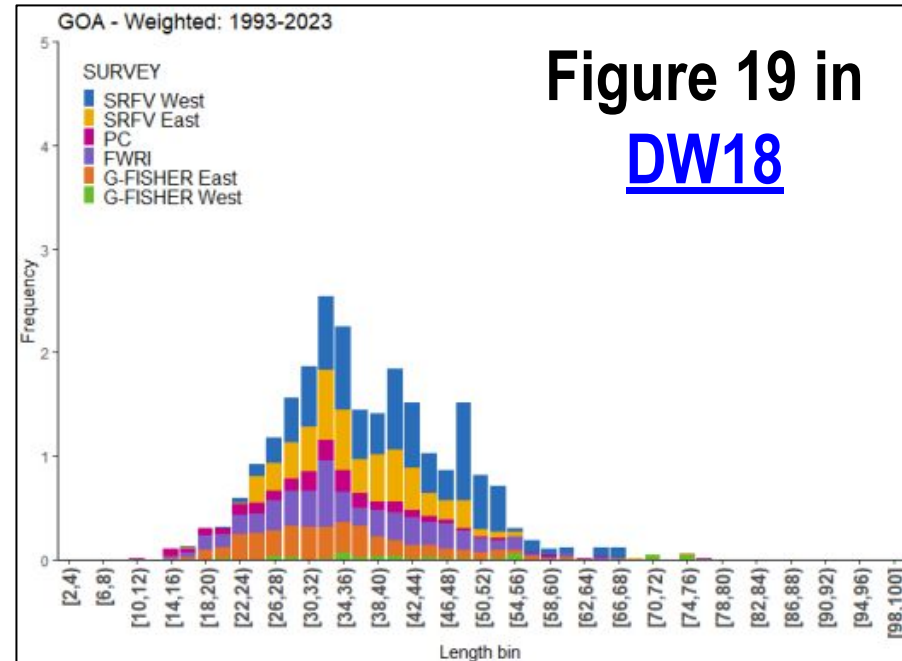
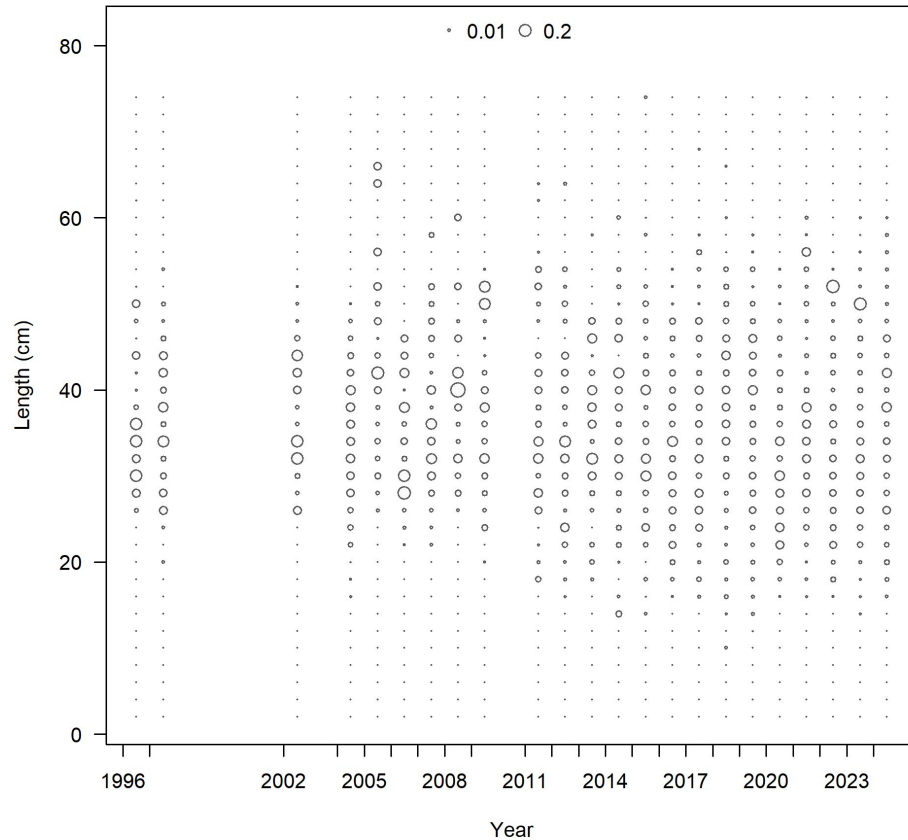


Figure 19 in
[DW18](#)

- Input sample sizes = number of stations (≥ 10)

Ecosystem considerations

- remote sensing data for sargassum coverage as a potential index of recruitment.

- Sargassum

- RESTORE project evaluated the importance of sargassum as a nursery habitat for fish in the Gulf
- Indices not submitted at this time due to limited spatial-temporal coverage
- No strong evidence of red tide mortality
 - Not mentioned in fishermen feedback (DW21)
- Negative effects hypothesized by Deep-water Horizon oil spill (DW10), but no clear evidence found in literature review

Questions about the data?

